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# A TREATISE

ON THE

PUBLIC HEALTH, CLIMATE, HYGEINE,

AND

# PREVAILING DISEASES,

OF

BENGAL AND THE NORTH-WEST PROVINCES.

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BY

KENNETH MACKINNON, M. D.,

*Surgeon and Medical Store Keeper, Cawnpore.*

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To

LIEUTENANT COLONEL PATRICK GRANT, C. B.,

*Adjutant General of the Bengal Army.*

MY DEAR GRANT,

*I dedicate this work to you with keen feelings of gratitude for past kindness.*

*When I asked your permission to do this, you expressed a wish that I had sought some higher name, under whose auspices to place my undertaking before the public. But irrespective of the gratification it afforded me to acknowledge your long and unchanged friendship, I thought that as the success of my work must depend on its own merit, it would be very appropriately dedicated to one, who has risen to a high public position by the able and sterling qualities of his own character.*

Most sincerely and gratefully yours,

K. MACKINNON.

# PREFACE.

After the composition of the following pages, I submit them with some misgiving to the public, because I feel that without much practice in book-making, and with too little time at my disposal to insure the necessary condensation of style and subject, much imperfection will be found. I trust to some indulgence from my readers, on the score of the subjects I have discussed being very extensive, while the execution of my task has been subject to constant interruption from professional duties.

It has been suggested to me by a friend that my remarks regarding public health and the sanatory regulations existing in this country are too freely spoken. I cannot think so, for I describe things as they are; and it ought not to be displeasing to a great, just and benevolent Government to know the truth It has been my object to shew that the population of the valley of the Ganges, (a region watered by innumerable rivers, and wonderfully rich in all the products that nature yields, and industry improves upon,) though amply supplied with the means of supporting existence, is subject to much disease that depends upon causes which might easily be removed; and I have dwelt upon the topic with some solicitude and repetition, having the impression on my mind that it must be the wish (as it assuredly is the duty) of a civilized Government to improve the sanatory condition of its subjects, as far as doing so is compatible with its other obligations. One great movement is in progress, and its success fully justifies further experiment—I allude to the institution of dispensaries.

In the chapter on Hygeine I have endeavoured to write practically with reference to this climate, and I have dwelt in particular on the means likely to improve the health of the European soldier. Since the section on Barrack Hygeine was written, nearly a hundred of these noble fellows have fallen victims to disease at this station, while their officers and the native troops have remained healthy. It is to them, and to such as them, that England owes her conquest and her maintenance of this magnificent empire; and it would surely be well if we could teach them the way to a higher point of respectability and happiness, and to the improved health which these would assuredly occasion.

In the chapter on Diseases, I have, when laying down principles of treatment, found difficulty in pointing out with accuracy how the varying phases and symptoms of disease require corresponding modifications of treatment; yet I believe that it is on the observance of this truth, opposed to the dogmatism that treats disease by name and by a routine system, that the success of a practitioner depends.

Since I published the prospectus of this work, in which I made a few remarks on the respective merits of mesmerism and the inhalation of æther, a great discovery has been made for the relief of human suffering. I have seen chloroform tried in many severe operations at this station, and can offer my humble testimony to its wonderful powers; but, certainly, I have also seen enough to justify the enjoinment of precaution in exhibiting this powerful substance. In two cases of severe operation after accidents, it reduced the powers of the circulation in a very alarming manner. I have alluded to this subject here chiefly for the purpose of testifying, as my situation enables me to do, to the promptitude and zeal with which the profession in Upper India has applied this great discovery to the relief of suffering humanity—a proof of how unmerited the taunts as to its non-adoption of mesmerism—evidence also of the rapid advancement of operative surgery in the interior of India. Good operators seem now the rule, while formerly they certainly were the exception. Let us hope that the other branches of medical knowledge are equally progressing.

I cannot conclude without expressing obligation to my publishers for the patience and diligence with which they have striven to overcome the difficulty of a somewhat hieroglyphic caligraphy. Some errors of type will be found, but they are not numerous or important.

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## PREVAILING DISEASES.

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## LIST OF ERRATA.

Page 1, *for* mankind *read* man.

Page 7, *for* pthisis *read* phthisis.

Page 36, *for* catheters *read* catheter.

Page 37, no point of interrogation after the word "people;" and no capital letter in the word "as."

Page 37, *for* the apeutical *read* therapeutical.

Page 44, *for* had had *read* had.

Page 48, *for* run up to Vindhyah *read* up to the Vindyah.

Page 48, *for* labarynth *read* labyrinth.

Page 49, no stop after "weather."

Page 204, *for* sixcapisms *read* sinapisms.

Page 205, *for* draphoretics *read* diaphoretics.

Page 214, *for* epidemics some seasons *read* epidemics of some seasons.

Page 239, *for* indication *read* induction.

Page 270 *for* vens *read* veins.

Page 276, *for* brondical *read* bronchial—(a foot note.)

Page 285, *for* inaintion *read* invasion—(a foot note.)

Page 289, no stop after the word "eyes."

Page 295, *for* drop *read* drops.

Page 300, *for* effusion *read* affusion.

Page 307, last line, no full stop after "dysentery."

Page 309, *for* jail *read* jails.

Page 319, *for* up on *read* upon.

Page 328, *for* part *read* point.

Page 337, *for* ingenuously *read* ingeniously.

Page 351, *for* that because of their general health being impaired, *read* because their general health is impaired.

Page 358, *for* untampered *read* unpampered.

In note to page 359, *for* gustric *read* gastric.

# CHAPTER I.

## PUBLIC HEALTH.

General objects of the work.

I purpose in the following pages to give a general view of the public health of the Native and European population of the Bengal Presidencies; to describe the climate, and its effects; to offer suggestions for the preservation of health; and to state the results of my own observation of the causes, symptoms, and treatment of the prevailing diseases.

Public health.

My first subject is public health; and its importance will appear obvious enough, if we consider the millions of people inhabiting this great valley of the Ganges, and the amount of disease which prevails. It admits of proof, that there is a loss to the state, and certainly to productive industry, in every hour of every individual's sickness; and the effect of disease upon human happiness is interesting, but painful, to consider. But the mere speculation upon the extent and sources of public sickness, would be of little importance if we had it not in our power to suggest remedies,—and remedies, too, that in many cases are easy of adoption. Disease depends partly upon general climate, the range of the thermometer, its sudden alteration, the prevailing winds, the fall of rain, the level of the lands, the quality of soil, &c.; but it depends also in part upon mere local causes, and on the social condition, habits, and morals, of the population. All circumstances shew how Providence encourages mankind to progress in social and moral improvement, for of each step in advancement and civilization he himself reaps the reward in his increased happiness and comfort.

Its interest.

The health of Europeans in this country has importance in other respects than those of the general character alluded to. Much of the good and efficient government of the country depends upon the health of public servants; and even our tenure of India may truly be said to depend upon the European troops. We all know how sadly they suffer from disease, and at what an enormous expenditure of life and money they are kept efficient. I believe I shall be able to shew that even in this climate it might be otherwise.

The subject naturally divides itself into the consideration, 1st., of Native, and 2ndly., of European public health.

Native public health.

We have no statistical data by which to arrive at direct conclusions regarding the health and longevity of the indigenous population, or by which to compare them with other countries. Let me here express, how desirable is the acquirement of such knowledge, for it is the only true standard on which we can rely.* The indigenous people are the natural productions, the soldiery European and Natives, as well as the lay Europeans, are exotics, and the prisoners in jails, owing to their peculiar conditions give no fair results.

The following are at present questiones vexatæ:

Effect of elevation and dryness of soil.

1st. How far mortality is influenced among the indigenous population by the distance from the equator, and what accompany that circumstance here—a gradual elevation of the land above the sea's level; a drier soil, and less stagnation of water? Observation would lead us to conclude that these must exert a favorable influence, even though the heat is for a time fully as great in the North West as in the Bengal Provinces, lying in the tropics; but on the other hand the cold weather lasts longer, and the fall of rain is less. We know that the great deltas of rivers are unhealthy in all hot climates. Witness the great rivers of China, the Mississippi and Oranokoo in America, and above all the Niger in Africa. The whole of Bengal Proper may be called the delta of the Ganges.

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* But there are many causes which disturb the complete accuracy of Returns on vital statistics. What we do learn by them, however, is practical and useful, and has truth for the ground work. How far such proofs that even life is influenced by general laws interfere with the doctrine of a special providence, I do not venture to discuss.

I find, that during nine years from 1835 to 1843, the deaths among prisoners in the Lower and Upper Provinces, together averaged 7.67 per cent, among the Native Soldiers in the same period 1.58, and among the European Troops 5.143 per cent; in Calcutta the deaths among Hindoos is, 6.$\frac{1}{12}$ per annum, Mahomedans 2.$\frac{3}{4}$.

Effect of large rapid rivers.

2ndly. What are the effects of the vicinity to large rapid rivers? I believe these must be favorable too, because here will be felt the full influence of the monsoons—air is cooled by passing over water, and the fall of rain will be also more regular. I have not observed that the inundation, or subsequent drying up of the great Indian rivers are injurious, unless it be where their course is stagnant, or obstructed much by banks or islands covered with vegetation.

Marsh.

3rdly. To what extent does marshy ground and stagnant water prove hurtful? Here indeed we have a question which might well occupy a volume of itself. I can only glance at some of its bearings. In the Upper Provinces there is little marshy ground, comparatively, and not much, stagnant water in most situations,—but the soil is very porous, and ravines into which the rain water finds its way, and not always a free outlet, are a common feature; certainly fevers, according to my observation, are at times as common in the Upper Provinces as in districts where there is much more marsh and stagnant water, but with exceptions* the type is milder.

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* Parts of Bundlecund are said to be noted for fevers of bad type. Ravines are I believe, very common in that province.

I await with interest the report of the committee now sitting on this subject, and regret that my time would not admit of my replying to the questions submitted by its members. There is nothing more certain than that the nature, sources, and differences of vegetable poisons are yet subjects of great obscurity, in which perhaps some great discovery will be the reward of some enquirer. Chemistry is yet defective in its operations on the atmosphere.

Irrigation.

It seems undoubted that the irrigation of the cultivated land, by means of the canals lately opened in the vicinity of Delhi and Kurnaul, has greatly affected health in these places. Is the natural spread of water by inundation over land not cultivated equally injurious, or is the irrigation by well water also hurtful? I have already given my opinion on the first question, and with regard to the second my answer must be the same, as I have not observed that irrigation from wells affects the health of villages. The late Dr. Fergusson, in the valuable posthumous work lately published, has supplied us with facts, which, on the first blush, it may not be easy to reconcile with the above opinions in some particulars; but perhaps if we take into consideration, that in the production of fever much depends upon the nature of the soil, and on the fact of the water oozing into it, the apparent contradiction may be explained* This question will be dealt with more at length when considering the causes of fever.

Relative health of districts.

4th. During what months is the mortality greatest in the different districts, and what districts shew the highest rate of mortality on the whole year?

The solution of these questions would be of great interest, if it could be procured. In Calcutta it has been ascertained that of one thousand Hindoos there died, in seven Januarys, 27½; in seven Februarys, 12½; in seven Marchs, 18½; seven Aprils, 19½; seven Mays, 17½; seven Junes, 14½; seven Julys, 18½; seven Augusts, 26; seven Septembers, 28; seven Octobers, 30; seven Novembers, 34½; seven Decembers, 31½. The above extracted from a paper of Mr. Martin's, who acknowledges himself indebted for it to Dr. Duncan Stuart, is very curious and instructive. It shews what we would scarcely have expected, that the cold months are the most unhealthy, and other tables prove that the same is true with regard to Europeans, and, in both cases, it must also be considered that March, April, and May, are the worst cholera months. The causes of disease in the cold season of Bengal, will be found alluded to in the article on climate. I believe that the case must be very different in the Upper Provinces, that the rains and drying up months would shew the greatest mortality, and that between the two extremes of climate and country, we would find gradual results. As to the relative mortality of districts, we can only infer from general reasoning, that such as have the most prolonged heat, and the greatest quantity of stagnant water, are the most unhealthy.

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* The absence of water, where it has previously and recently existed, is what Dr. Fergusson considers essential to the existence of miasm. His opinions are by no means universally received, and will be found ably canvassed by Dr. Jas. Johnson. I have not seen fever myself produced in dry surfaces; but I know that in the lower ranges of hills, and in the forests at their foot, it is often deadly.

The result of observation would seem here to uphold general principles. Thus Rungpore, Purneah, Goruckpore, and Tirhoot, are inferior in point of climate for Natives, to Bhaugulpore, Monghyr, Patna, and Gyah, on the opposite and drier side of the Ganges; and the natives of the Upper Provinces are a far healthier and stouter race, than in any of the districts named.* The comforts and luxuries of the European in India seem in a certain degree to counteract the effect of damp, heat, and malaria; and it may be doubted whether health is not as good among Europeans in the upper ranks in Bengal, as in Upper India. If there is more damp and miasm, there is less intense dry heat.

General sketch of native public health.

A general consideration of the subject of native public health, in the absence of specific data, leads me certainly to the conclusion that it is at a very low standard, compared with other countries. Many women perish in giving birth to their

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* The districts that run along the north or left bank of the Ganges, enjoy a cooler climate than those on the opposite bank. They feel the influence of the great Himalyan chain, more rivers meander through them with a duller stream, the soil is lighter and more covered with vegetation. Along these districts, too, and separating them from the lower range of hills, lies the great belt of forest called the Terai; a Golgotha in the hot months and rains, but in the cold months singularly harmless.

Childbirth and infancy.

children, and their offspring share a similar fate, for, though nature is all bountiful in the general plan, cases do occur where art would save life, and of the obstetric art their ignorance is profound. Infant life, too, is rendered very precarious by reason of many influences, added to those which are the common lot of humanity.* Escaped from these dangers, the adult is yet exposed to many risks, some of which depend upon the state of morals and social institutions; others upon the climate. I may mention the system of caste, the diet enjoined by Hindooism,† (impoverished diet generally) and the fasting days of the Mussulman creed, early marriages, and polygamy, weak moral restraint, the in-door confinement of the women of higher rank, constant exposure to extreme out-door vicissitudes of temperature, and often to wet, faulty accommodation, scanty clothing, the stagnation of water in marshes and jheels, localities imperfectly ventilated, and tainted with noxious animal and vegetable effluvia, the use of opium, hemp, and impure water. These are many, but not all the causes of disease among the natives. Fever, Dysentery, and cholera, may be called the great staples of mortality; but as we have become more acquainted with the subject, and have studied their other diseases more accurately, we find that they assimilate more than was supposed to those of our own country. When I studied, it was a doctrine of the schools, that Calculus was a rare disease in India. What is the fact? Mr. Brett performed one hundred and eight operations of Lithotomy; I myself performed it seventeen times in six

General causes of disease enumerated.

Prevailing diseaes: fever, dysentry and cholera; other diseases resemble those prevailing in other countries.

Calculus.

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* It must, however, be taken into consideration, how little they suffer by measles, scarlet fever, and hooping cough.

† The small quantity of salt used by the poor, must be very injurious, and is probably one cause why they are so subject to worms at all ages. The high price of this commodity is a grievance to the poor.

Rheumatism I suspect is more common than in colder climates.

It would perhaps have been considered tedious, if I had gone on to show in what manner each cause of disease above mentioned operates injuriously; most indeed of what I could say will readily occur to the reader himself.

years; and at this station, in the Dispensary which is under the able superintendence of Dr. Edward Goodeve, I have seen three operations for stone in one morning. Who had heard of Paralysis of the portiodura in India, notwithstanding the peculiar symptoms, 'till the profession became familiar with Sir Charles Bell's beautiful discoveries? Now, we have almost daily opportunities of seeing this disease, particularly as a local affection, not dependant on cerebral derangement. Pleuritis I have seen prevail much among prisoners in jails at certain seasons, and Pnumonia is common in this part of India, at least, as a complication in fever, and as an idiopathic affection, to an extent far beyond what was suspected before the stethescope came into use, and directed particular study to chest diseases. We also find apoplexy, epilepsy, and paralysis to prevail extensively. Hepatitis in its acute and idiopathic form is not common; but chronic enlargement of the liver and spleen, is a frequent consequence of repeated attacks of fever. These, and the ultimate common termination in dropsical effusion, are most common in the humid and lower districts; but I have met with them here much more frequently than I had anticipated, and I believe that in Bundlecund and the districts bordering on the Terai, the same will hold good, also in Delhi and Kurnaul, as already hinted at. Pthisis and the granular disease of the kidney, are by no means uncommon; to what relative extent in different parts of the country, will no doubt some day be made the subject of interesting inquiry. To the last named disease my attention was first particularly directed by Dr. Edward Goodeve, and let me here venture to express a hope, that he will some day favor the profession with the result of his observations, on some at least of the above subjects. I know how closely he is engaged in their study, and how able he is to record the result for the benefit of others.

Paralysis of the portiodura.

Pleuritis.

Pnumonia.

Apoplexy, Epilepsy, and Paralysis.

Enlargement of Liver and Spleen.

And among what classes.

Pthisis and disease of the kidney.

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Diabetes Mellitus I have met with; inordinate discharge of urine, without the saccharine character, I have seen very often, especially in fat natives; Goitre seems an endemic of Behar, as is elephantiasis of Bengal Proper; Lepra is known in all, but is most prevalent in Bengal, and least so in the Upper Provinces.

Malignant diseases.

Diseases of the skin.

Venereal—use of mercury.

I have met with the malignant degenerations, common to other countries; the diseases of the skin appear in all their variety; and venereal is prevalent, its ravages being fearful in some of its forms, because even the most simple means of cure are often not available.[*] When mercury is prescribed, it is used without any discrimination,—a fact that need not excite our wonder, when we bear in mind that thirty years ago English practitioners administered it, according to the quantity of saliva discharged, the teeth, and some times parts of the jaw bones, falling into the spittoon. The ignorance and superstition of those who practise medicine amongst them, must greatly affect the duration of life, in the natives of a country where the climatic sources of disease are so numerous, and where they are themselves so regardless of the resources and contrivances which might insure them a share of immunity. The Mussulman practitioners, by their heating and cooling system, do some good, and at any rate not much harm: but with the Hindoos it is chance work—empiricism grounded on superstition. I might hint at the great amount of good which might be effected by good medical police sanatory regulations, and by the location of some of the youths educated at the Medical College in the interior of districts; but I suppose the expense is at once an insuperable obstacle, (the great millstone hanging round the neck of all Indian improvement.) One ignorant, like myself, of politics and finance, asks himself the question, why England, with her eight hundred millions of debt, is running the rapid race of improvement, while this magnificent province of her empire, rich in natural resources, in produced wealth, and an industrious population; and with her public debt a mere trifle in comparison, is moving her slow length along, leaving the ce-

Native practitioners.

Suggestions on Medical Police.

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The rarity of disease of the arteries, is curious, and worthy of notice; nor is hernia so common as we might expect; but I have seen both diseases. One case of aneurism of the external iliac, or one of its branches, underwent a cure by sloughing.

We may be surprised that diseases of the eyes are not more prevalent.

lebrated saying of Burke almost yet literally true, that if we were driven from India, there would be nothing to trace our occupation of it.

Spread of variola.

Causes which retard the success of vaccine.

Suggestion.

Concluding suggestions on native public health.

As soon as each hot weather sets in, the native inoculators commence their trade, sewing the seeds of variola in the crowded, ill-ventilated, and filthy villages and towns.* The crop is abundant, and in some seasons, to drop metaphor, the mortality is fearful. Considering the obstacles to the spread of vaccination; the small sum allowed for the object, 40,000 rupees among more than as many millions; the liability of the disease to become inert or spurious; and the prejudices of the people against its use; it has often suggested itself to me, whether it would not be better to organize a system of inoculation, susceptible as it would be of a wide spreading usefulness. In conclusion of this branch of the subject, I may remark that, though tropical heat, luxuriant vegetation, and damp, low lying soil, are inimical to health, yet these causes would have much less effect, if the people were advanced in their social condition, and the local, particular and more tangible causes of disease removed. Then, perhaps, we should find that this climate approached in salubrity nearer than we imagine to that of our own country. There a great part of the population have the means, and make use of them, of guarding against disease. Here the bulk of the people are poor and comfortless; the rest quite ignorant of and indifferent to the art of preserving health. While commenting on the absence of great public measures, for improving health, it is but fair to notice how far happier the condition of the bulk of the population must now be, to what it ever could have been under Native Government. No people can be happy, while their lives and property are unsafe. Such to a great extent was the state of things under the best of the Mahomedan Governors, and even with regard to health, a movement has been made in the proper direction, by the institution of Dispensaries in the large towns.

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* The least that we should do would be to devote a part of the resources of India to the improvement of the sanatory condition of its cities.—*Lancet.*

The truth is, says Monsieur DeMetz, in a letter on prison discipline, a country is not exhausting its resources, when it is establishing useful institutions,—on the contrary it is enriching itself.

For sanatory suggestions, see the appendix to the chapters on public health and climate, and the chapter on Hygeine.

Health of prisoners.

The subject of health and mortality among prisoners, is interesting in many points of view. This unfortunate class amounts to upwards of forty thousand—they are treated medically after the European system; their diet, clothing, labor and accommodation, are under our control. I find in Mr. Hutchinson's work on jails, that the mortality stood thus in 1843:

Rate of mortality.

| | |
|---|---|
| Lower Provinces, including Dinapore Division, | 9.28 |
| Upper Provinces, .. .. | 6.84 |

and in another table for nine years, from 1835 to 1843, the deaths are greater in the Lower Provinces in all years but two; one of these, 1838, the year of a great famine in the North West, while the average of both is 7.67. Turning to the late report of Mr. Woodcock, the Inspector of prisons in the Upper Provinces, I am struck with the fact, that in the jails subject to his control there died during 1845, at the rate of 9.89 per cent, in all 1862 men; from which we may warrantably infer that the praiseworthy desire of the Government to lower the rate of mortality in the Indian jails, has not yet been successful.* It is true, that to such desire there was added the wish to improve prison discipline, and thereby to check the commission of crime. The true system of prison discipline, as regards the moral improvement of prisoners, and the prevention of crime in others, does not seem yet fully understood, if we may judge by the discussion and experiment yet going on in Europe and America; and as regards health my own opinion is, and I have had some experience, having been for fourteen years a Civil

Prison discipline.

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* In English prisons the deaths may be stated at 2 per cent; in France 4½. Not more than 14 years ago the deaths were one in 11. The Americans have the advantage of the nations of Europe in this branch of political medicine.

Surgeon, that the late changes have decidedly had an injurious effect upon the health of the prisoners. That prison discipline has been improved there can be no doubt of; whether this will prevent crime has yet to be proved. We cannot, I think, expect that mere prison discipline will prevent much crime in a community so callous and ignorant,—at any rate, while other parts of the system for punishing crime are so imperfect; such as the form of trial wanting in all imposing solemnity, and the miserable system of police, owing to which crime goes so often unpunished. Added to the introduction of the messing system in some jails, all the links in the chain of prison discipline have been strengthened: labor is more regularly exacted; the prisoners are more strictly and closely confined in wards,* and they are less taken in gangs over the country. In some respects, such as clothing, apportioning labor, more care as to cleanliness, there has been improvement; but let returns be called for, and they will shew whether my opinions be correct. I have taken the trouble to calculate the mortality of the jails, under Mr. Woodcock, in reference to messing; and I offer the result, stating in fairness, however, that there ought to be a comparison with the former mortality in each jail.

Ignorance of the people, and state of the police, reasons in the author's opinion why prison discipline will not prevent crime to any extent.

Prison discipline stricter than formerly.

Effect on health.

JAILS IN WHICH THE MESSING SYSTEM IS WHOLLY ENFORCED.

| | |
|---|---|
| Delhi, deaths per cent per annum, 1845, | 26.13 |
| Paneeput, .. .. | 13.66 |
| Goorgaon, .. .. | 12.14 |
| Allygurh, .. .. | 7.80 |
| Muttra, .. .. | 4.80 |
| Agra, .. .. | 10.86 |
| Boolundshuhur, .. .. | 4.78 |
| Kytul, .. .. | 21.14 |
| Average, | 12.36 |

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* And this point of ventilation, on which the report of Mr. Woodcock gives such practical and distressing details, is perhaps of all others the most important: 600 cubic feet of air has been considered necessary even in a cold country—not half that is available in any jail, and in some instances 70 cubic feet is the miserable quantity.

### Jails in which it partly prevails.

| | |
|---|---|
| Almorah, | 4.41 |
| Futtygurh, | 5.08 |
| Bareilly, | 2.72 |
| Moradabad, | 11.00 |
| Budaon, | 12.09 |
| Allahabad, | 16.86 |
| Mirzapore, | 12.46 |
| Azimgurh, | 4.72 |
| Average, | 9.90 |

### Jails messing general with exceptions.

| | |
|---|---|
| Rohtuck, | 8.54 |
| Etawah, | 4.56 |
| Mynpoorie, | 8.36 |
| Futtypore, | 9.84 |
| Humeerpore, | 7.31 |
| Jounpore, | 14.23 |
| Subathoo, | 7.97 |
| Moozuffernuggur, | 8.91 |
| Shahjehanpore, | 6.15 |
| Average, | 7.94 |

### No messing.

| | |
|---|---|
| Bijnore, | 6.74 |
| Cawnpore, | 5.30 |
| Hissar, | 2.52 |
| Sirsa, | 7.75 |
| Suharunpore, | 21.42 |
| Meerut, | 4.94 |
| Bandah, | 11.18 |
| Benares, | 7.90 |
| Ghazeepore, | 3.01 |
| Goruckpore, | 6.01 |
| Loodianah, | 10.18 |
| Ajmere, | 3.86 |
| Deyrah, | 4.72 |
| Umballah, | 19.64 |
| Ferozepore, | 9.80 |
| Average, | 8.25 |

Diet of prisoners.

In perusing Mr. Woodcock's report, one cannot but feel a conviction that he has bestowed much thought and research upon his subject, and that many of his views and suggestions are correct and ingenious. I mention particularly the subjects of ventilation, and teaching trades and manufactures to the prisoners in jails. But when we find him so staunch and able an advocate for the separate system, it is most singular to find how far he departs from his text—the adopted and approved systems in other countries, on the subject of diet.

Diet of English prisons.

At the model prison of Pentonville, on a diet of thirty ounces of food per diem, including four ounces of animal food, it was found that 62 per cent of the prisoners lost weight at the rate of five pounds a month—"it was frightful"—"death by starvation was not the object of Government." These are expressions from a public document; but I find that Mr. Woodcock's highest proposed rate of dieting, is only twenty-eight ounces. That ultimately approved at Pentonville is as follows:

### DINNER.

A pint of good soup, five ounces of bread, one pound of potatoes, and four ounces of meat.

### BREAKFAST.

Three quarters of a pint of cocoa, two ounces of milk, six drachms of treacle, and ten ounces of bread.

### SUPPER.

A pint of gruel, six drachms of treacle, and five ounces of bread.

If it requires this much food to keep an English prisoner in health, what are we to expect from the following diet roll for natives?

Diet proposed for native prisoners, in Mr. Woodcock's report.

Strong and able-bodied men on hard labor:

| | | |
|---|---|---|
| Ottah, | .. .. | 12 chittacks, or 10 of rice. |
| Dal, | .. .. | 2 chittacks. |
| | Total, | 14 chittacks, or 28 ounces. |

To this add 90 grains of salt, and 36 grains of pepper; and we have the highest quantity of food and condiment proposed to be given to a prisoner in twenty-four hours; the quality may be changed to rice or vegetables twice a week, but this change, so very essential to health, does not appear to be insisted upon.

I have always been of opinion that the messing system, independent of mere quantity, exercises a very depressing mental effect upon natives, opposed as it is to their customs and prejudices. That opinion was recorded long before the late outbreaks in many jails. The prisoners have on these occasions resisted its introduction, when they must have known death would be the consequence to some of them.

General inferences as to local nature of the causes of disease.

The tables of mortality in the jails of some districts will exhibit the truth, how local, and dependent on minute circumstances, may be the causes of disease, and how little at times connected with the circumstance of general climate; and indeed we have a proof in this how much human habits may modify, or counteract, or aggravate, the effects of climate, some of the districts shewing the highest rate of deaths are remarkable for salubrity. Hard work, with bad diet, mental depression, and breathing impure air, will have an injurious effect in any climate, but will prove especially baneful in a bad one.

Diet of prisoners again alluded to.

The question of dieting prisoners is so interesting, on the score of humanity, that I will venture to offer a few more remarks on the subject. I have perused the valuable tables of dietaries given in Pareira's work; none of them are nearly so low as those proposed now for general adoption; and it is proper to mention that some of the dietaries at present in force are

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At Pentonville, there is only one death in two hundred. In the jails of Upper India, there were in 1845 one death to almost every ten prisoners.

The great fatality of inflammations supervening in a reduced state of the system has lately been firmly established by Mr. Louis.—*Lancet.*

I have learnt from Mr. Woodcock himself, that the lungs of prisoners are often found diseased.

Author's opinion on diet.

even below this standard. I can have no hesitation in stating that at all seasons, but especially during the cold weather, the diet should be increased, and that at all times there should be much more variety. "Notwithstanding that bread is denominated the staff of life, alone it does not appear to be capable of supporting prolonged human existence."* In fact no diet can be healthy that does not give a change of nutritive substances. Wheat it is true contains most of the constituents of the tissues, but not all of them. Five ounces per week, or about three hundred and forty grains per diem, is the supposed usual consumption of salt. To reduce that to ninety grains, appears to me a dangerous experiment; as a condiment, it is more necessary than in cold countries, and this article is a constituent part of the blood and of the animal organized tissues, but not of vegetables. This last fact is important.

More salt and food, and two cooked meals a day, considered necessary.

Opinion of the Medical Board.

It is opposed to the opinion of all writers on diet, only to give one meal a day. There should be two cooked meals at least. This, and that a prisoner on hard labor should be allowed twenty-two and half chittacks, or forty-five ounces of food, per diem, was, in the opinion of the Medical Board, essential to preserve the health of prisoners, as recorded by Mr. Hutchinson, in his work on jails. It must not be lost sight of that it is now well ascertained that prisoners require more food according to their term of confinement, and the English dietaries are now modified accordingly.

Health of the Native Army.

The health of the Native Army has next to be alluded to. If we were to form our estimate here of the importance of the subject by the mere casualty lists, it would be a great mistake. It is a loss to Government every hour a Sepoy is in hospital, and we must remember, how many men of the Native Army go to the Invalids from the effects of sickness. The mortality in the whole Army is not above $1\frac{1}{2}$ per cent, and if we excluded Bengal, which may be called foreign service, there would not

Rate per cent of mortality.

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* Pareira.

be one death to a hundred men. In England there is one death to forty-eight of the whole population.

Deductions from low rate of mortality.

Many interesting deductions are to be drawn from these facts. Temperance alone will not keep a man healthy, or the Sepoy would not be healthier than the villagers; but give pure air, good food, and clothing, added to temperance, and we have proof of what I have ventured to advance in this work—that this climate is not essentially very destructive to life. With respect to diet again, if it be true, as I believe it undoubtedly is, that fewer Mussulman soldiers die, in proportion, than Hindoos, this would seem to prove the benefit of animal food; for I believe it is on this point only that there exists any material difference. When we compare the Sepoy's health with that of his Officer's, and of civilians', we must not place all the balance there is in his favor to the account of temperance: we must recollect that he is, generally speaking, living in his own climate. Take him to Bengal, and we shall see that his vegetable diet does not save him. He suffers there from the greater damp, but chiefly from the change in his diet, from ottah to rice, the latter being a substance far inferior in nutritive quality to the former.* And the late visitations at Delhi and Kurnaul shew that he cannot resist the intense influence of malaria. High temperature and exposure he does resist far beyond the endurance of the European.

Compared with his Officer's and civilians'.

Mortality in Bengal.

Relief of regiments.

Since the causes which do undermine the sepoy's health, operate gradually without destroying him suddenly, it has been made a question whether it would not be advisable always to have a quick relief at the unhealthy stations. Surgeon Finch stated that he had proved by figures, that it was only after the second year the mortality became serious. I believe that, in consequence of the above Officer's statements, Regi-

Mr. Finch's views.

Barrackpore.

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* Besides this, we must not forget that sudden and entire changes of diet are often hurtful. The Sepoy could no doubt get ottah in Bengal, if he liked to pay for it; but, as it is dear, and rice cheap, his natural parsimony comes in the way. If he gets ottah at all, he buys it adulterated.

ments are now relieved at Barrackpore every two years. I have heard other Medical Officers state, that Mr. Finch's view of the case does not always hold good; but, even if not, the present plan seems the safest.* There is another thing which seems worth mentioning regarding the movement of corps to Bengal. A march in the same year from the banks of the Sutlege to those of the Hooghly, involves a great and rapid change of climate, and of diet too, with the Sepoy, since cheap wheat is not to be procured in Bengal, and few Sepoys will eat it when dear. It would seem that a gradual movement in each direction would be more advisable—as we proceed downwards the production of wheat becomes gradually less.

Suggestions regarding relief of regiments.

The Sepoy's health suffers from his sudden change, often from a warm, comfortable dress, to scarcely any clothing. I have known half a regiment go into hospital at the setting in of the cold weather, from the men throwing off their woollen dresses, while heated by parade exercise. This practice of undressing when off duty, I have no doubt, is often the cause of rheumatism, a common source of invaliding in the Native Army. Too much care cannot be taken to keep the Sepoys' lines clean,—as they live in low, damp huts, and live upon vegetables, they are very susceptible of malarious influences; and it is now well known that it does not require an extensive marsh to generate miasm—a little dirty pool, if near, may be more hurtful.

Clothing of Sepoys.

Cleanliness of lines.

The non-inflammatory character of the native constitution has been so constantly spoken and written of, that we are apt to make ourselves think they are not subject to inflammation

Remarks on treatment.

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* Since writing the above, I have had an opportunity of perusing Mr. Finch's paper. He seems to me to make out his case well, that the mortality increases much after the second year, and, besides this, that the longer a corps is in Bengal, the longer does it take to become again efficient. But on the subject of diet he seems to me to overlook that the change of diet acts by debilitating, and thus increasing the susceptibility to malaria.

at all. I am inclined to think that this leads to some harm in theory and practice.

Too early recruiting.

I believe much sickness and early invaliding to be the consequence of the early age at which recruits are entertained. The private interests and feelings of individuals have consideration beyond the good of the state.* A return has lately been called for from home, to shew, among others things, the proportionate deaths in the Native Army at particular ages. In two regiments here, one shewed an immense majority of deaths in the youngest men; in the other there was no regularity, except, perhaps, that the youngest and oldest were most liable to death.

Returns lately called for.

Digest of Dr. Finch's tables.

The following is a digest of Mr. Finch's various tables, which, as mentioned in a note, I have seen since the foregoing remarks were written.

1st. They shew that the number of sick, or admissions into hospital, increase in Bengal, and especially at Barrackpore; but they do not increase so much in proportion as do the per-centage of deaths.

2ndly. They shew that the fewest deaths are under twenty years of age—the most, by a large proportion, between twenty and thirty—the next between thirty and forty, &c. This table is valueless, as a comparison of the value of life to age, because we do not know the proportion of men of each age in the Regiment.

3rdly. We have a table to shew that in three years (1835, 1836 and 1837) the 3rd Native Infantry lost twenty-six men at Mynpoorie, and that at Barrackpore, in 1838, 1839 and 1840, they lost two hundred and three—the average numerical strength of each series being seven hundred and fifty-three and eight hundred and sixty-five. *Quod erat demonstrandum.*

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* What I mean is, that the sons and relatives of native soldiers are entertained before they are old enough for duty.

4thly. We have the same sad tale of another Regiment—the 57th.

Deaths at Benares in three years, thirty-five men ; at Barrackpore in the same period, two hundred and forty ; average strength of the two series of years, seven hundred and forty-nine and eight hundred and ninety-two respectively.

5thly. We have the curious fact of the 58th Native Infantry having enjoyed as good health at a Bengal station, Jumaulpore, as it could any where ; twenty-four deaths in three years, immediately after which it moved to Barrackpore, where it lost two hundred and eight men during the next three years.

6thly, and lastly, we have the following results of casualties and invaliding in three Regiments, the 3rd, 57th, and 58th, for the three years succeeding their departure from Bengal.

*3rd Regiment.*

| | | |
|---|---|---|
| Died in the three years, .. .. | 170 | |
| Invalided, .. .. | 75 | |
| Total lost to the service, | | 245 |

*57th Regiment.*

| | | |
|---|---|---|
| Died, .. .. | 191 | |
| Invalided, .. .. | 28 | |
| Total lost to the service, | | 219 |

*58th Regiment.*

| | | |
|---|---|---|
| Died, .. .. | 173 | |
| Invalided, .. .. | 38 | |
| Total lost to the service, | | 211 |

Grand total lost to the service in three years out of three Regiments, } 675 men ;

and in the loss we must include the time it takes to make the recruited substitute of each efficient.

Great extent of invaliding.

Suggestion for lightening the burthen upon the state.

During the years 1844, 1845, and 1846, there have been two thousand three hundred and sixteen men invalided from the Bengal Army. It seems impossible to doubt that many of these men, although unfit for field duty, are yet quite capable of doing the state some service ; and it becomes a matter of serious consideration whether they might not be made available for cantonment and garrison duty, and for treasure escorts. The Invaliding Establishment is a vast drain upon the resources of India, and, though all must admit that there is no other thing which binds the Sepoy more to the service of the Indian Government, surely it ought be advisable to lighten the burthen, especially if this were done, as it might be, in a way to increase the Sepoy's attachment to the service.

European public health.

Early effect of the climate on children.

We have a proof of the effect of the climate on the European constitution, in the early drooping and decay of children born in the country. Even when there is no tangible disease, nutrition and oxygenation do not appear to go on favorably; the skin is pale, the muscles wanting in substance and in tone, the joyous spirits of childhood are wanting, the body is inert, and the mind listless. Mr. Martin states that in Calcutta few children continue to grow up with the signs of health beyond the fifth or sixth year. In my experience in Behar and the North West, I would say the ninth or even the tenth year. The fact mentioned by Mr. Twining, and corroborated by Mr. Martin, that there is no instance of a third generation from unmixed European stock, appears to me of extraordinary interest, in a physiological point of view, chiefly as shewing how much constitution is a matter of descent from the parents; but also with reference to the great question of the varieties of the human race, and the descent of all from an original pair.* The extreme heat, the sudden changes of temperature, and the coldness of one particular season, make the period of dentition be accompanied with head determination and bowel disturbances; but, considering the great comparative exemption

Subject very interesting.

General remarks on health of children.

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* Regarding the descent of all the present varieties of the human race, from an original pair, there need be no doubt, even on grounds purely scientific. The European varieties of the domestic animals degenerate much after the same manner as human beings. It is certain that this country could not be peopled abruptly from Europe; but the gradual extension of the human race from Central Asia, has enabled the different races to inhabit all climates.

from scarlatina, rubeola, and even variola, and the mild invasion of pertussis, we may be warranted in concluding that the children of parents, in comfortable circumstances, are not severely visited. There is a watching solicitude on the part of parents, and even on that of the medical attendant, as he is usually the personal friend of the family, and has besides a limited field of professional anxieties, which in my opinion has a great effect. Disease is sooner treated and more easily checked consequently. A modern fashion has arisen, requiring remark. I allude to bringing up children at the Hill Stations. The question has a medical and a general bearing. On the first, I would remark that the change is not absolute enough, and, without arguing the question further, I will ask to be shewn a hill-grown bird, hatched on the plains, with the same brilliant plumage as one who has had his flight to the old country. With respect to the second question, I might be content with what has already been written; but I will just mention, that it is impossible to make the education strictly an English one—and even if we had the domestic economy of schools, and the system of teaching, strictly homelike, where is the education the mind is receiving out of school at every hour, and by all its senses, these out-posts to the citadel of reason? The bodily organization may come to considerable perfection in the Hill Stations, and no doubt a very rational and intelligent being may be reared there; but he will not be an Englishman, nor a Scotchman, nor an Irishman, or so good a man in mind or body as either.

Rearing children in the Hills.

The deaths among the Civil Servants of all ranks, are ascertained to be about 2 per cent. The popular belief that life becomes more valuable after a few years' residence, or what is called seasoning, has been proved to be incorrect.* Age exerts its influence here, as elsewhere, in lowering the value of life. Civilians in general do not I think look such healthy or

Health of Civil Servants.

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* Mr. Edmond makes a different statement—*see Lancet, page 438, volume 2,*—1837-38.

robust men as Officers in the Army, proving, as I shall have to notice elsewhere, that the duration of life does not always depend upon a high standard of health. This class of public servants suffer from the sedentary life they lead, and from passing much of their time in dark, shut-up houses, and crowded, badly-ventilated public offices. Those complicated and ill understood complaints of the liver and digestive organs, usually disposed of under the convenient generality of dyspepsia, are common among them. Nor must we forget that the intellect has here more work forced upon it, than among other classes of public servants ; but they escape the dangers of exposure that Officers serving in the line are subject to, and have luxuries and comforts beyond what most military men enjoy.

Health of Officers.

The deaths among Officers in the Bengal Army of all ranks, are about 3½ per cent. If we consider the number of Officers on the regimental and general staff, who are included in the calculation, but whose lives ought to be as valuable as those of Civil Servants, this increase of mortality is remarkable, and shews how much the military profession, even in times of peace, exposes life to danger in this climate. I have no doubt that small allowances have something to do with it : Cadets come out too young, and it will be seen below* that more Ensigns by a fraction die than Lieutenants—a fact probably depending upon want of precaution, and also in some degree owing to the absence of comforts.

Health of European Soldiers.

I am in possession of various tables on the mortality of European soldiery, which shew some discrepancies ; but we may safely state the existing rate to be about 5½ per cent, or 55 per 1,000. This rate is low,

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| | | | |
|---|---|---|---|
| * Ensigns, | .. | .. | 2.95 |
| Lieutenants, | .. | .. | 2.80 |
| Captains, | .. | .. | 3.48 |
| Majors. | .. | .. | 4.10 |
| Ranks higher than Major, | | .. | 4.67 |

Mr. Martin gives a table of twelve years' mortality in Fort William, shewing 73 actual deaths per 1,000. My estimate is from Dr. Burke's returns of the Presidency of Bengal. From the two we learn the greater salubrity of the North Western Provinces.

compared with what formerly prevailed, but much may yet be done, as I shall endeavour to shew in another part of this work. We have seen that 2 per cent, the mortality in the Civil Service, can be arrived at, in the way of reduction; so that at least 3½ per cent of the deaths depend upon the various circumstances wherein the Private Soldier differs from the Civil Servant. Let us hastily glance at these. He is more reckless and disregardful of his own health, and pays no attention to the means which are at his disposal for its preservation; he exposes himself to the sun, endangers his brain, disturbs the circulation, gets heated, and perspires freely, without taking any precaution, such as changing his dress, or avoiding draughts of cold air, while the skin is in this state of increased action, and consequently so liable to external impression. In diet, too, the Soldier is careless, especially in the use of half-ripe and acid fruits: but the great bane of his life and comfort is the use of spirits.* This is so well known as the source of sickness and of crime, that the notice of it would seem idle, unless we had something to suggest as a remedy; nor can we expect to be original on a subject that is at present engaging much public attention. The great heat of the climate, and the thirst and lassitude produced by it, appear to be the great causes of drunkenness; but the confinement within doors, the want of bodily or mental occupation, and the absence or distant prospect of reward for merit and good conduct, enhance their effect. The two last causes hinted at are removable, and I have no doubt that, when this is done, (the limited service seems to me to be in itself a boon and a reward) much improvement will be the consequence. Raise the Soldier in self respect, and in his

Causes which chiefly affect it.

Exposure.

Use of spirits.

Suggestions.

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* I find a return at page 557, volume 2. 1840 and 1841, of the *Lancet*, shewing that for three years, when the 26th Regiment consumed an annual average of spirits in three years of 1,000 gallons, the average of liver complaints was 128. In two other years that the consumption of spirits averaged 2500 gallons a year, the liver complaints were only 60 per annum. To give good beer cheap would do great good; when we cannot cure, we may often moderate symptoms.

Over crowding, and bad accommodation.

prospects, he will regard his life as worth preserving. The evil effect of crowding human beings together, is now being fully appreciated. In this respect, and in the character of their accommodation, there is a vast difference between the Civilian and the Soldier, and on this no doubt a good deal of the mortality depends.

Effects of want of free ventilation.

"During healthy respiration, the atmospheric air that supplies the lungs is constantly changed. If this renewal of the air is not provided for, but the same air is breathed over again, the circumstances attending respiration are altered." And again, "in the same proportion, for example. as the oxygenous contents of the air diminish, and the carbonaceous contents increase, less and less oxygen is absorbed, less and less carbonic acid is evolved, and when the air comes to have a certain proportion of carbonic acid mixed with it, which, from the experiments of Allen and Pepys, appears to be 10 per cent, no more carbonic acid is formed, and the elastic fluid no longer suffices for respiration, although it still contains something like 10 per cent of oxygen. A little oxygen indeed continues to disappear, but the respiration becomes laborious, and cannot be carried on without imminent risk of suffocation to any of the higher animals."* Below this point of approaching suffocation, much mischief may and does happen by bad ventilation; we may not always be able to keep the atmosphere clear of vegetable impurities, but the vitiation, which is the effect of bad ventilation, is within our control. In most of the barracks (those recently built are somewhat better) the men are much overcrowded, so that what they gain by non-exposure is more than lost by bad ventilation.†

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* The expansion of air by heat diminishes the actual quantity in a given space Mr. Hutchinson calculates that an individual requires a twentieth more air in India than in a cold climate.

† The hospitals are in general fine, capacious buildings, well suited to their purpose; but, with the usual extraordinary infatuation, they seldom have their broad face to the prevailing wind—and they are often much too far from the barracks, by which, in apoplexy and cholera, it appears to me that mortality must be increased. As far as I can learn from enquiry, there are no measures for meeting the invasion of these dreadful diseases on the spot.

I hope, before finishing this work, to be able to supply tables shewing the relative mortality of different stations; but we must not forget that the result may partly depend upon climate, and partly upon other circumstances, such as accommodation, different systems of discipline, &c. I have already hinted at my own want of full faith in statistical returns. Without giving reasons here, I will just mention a fact or two. In returns I find published in the *Lancet*, Volume 2nd 1841 and 1842, page 169, the rate per cent of mortality at Ghazeepore is put down at 3.7. I know that during the last years troops were stationed there the rate of mortality became much higher. Agra again was noted for its small rate of mortality, and its general salubrity. In the page referred to, the mortality stands at 2.4, the lowest in the whole table. Since that time the place has quite changed its character: Her Majesty's 39th had a dreadful outbreak of cholera while stationed there, and Her Majesty's 21st suffered very much from fever. Two thousand seven hundred and seventy-nine cases were treated in one year, out of a strength of one thousand and ninety-two. It is true the fever was not very fatal, but it was new there, and might have been of a worse type.* Kurnaul, in the same table, stands one of the healthiest stations in the Bengal Presidency, 2.6, yet has since been abandoned for its insalubrity. In 1843 it was 9 per cent. My inference from these facts is, that, though the returns are correct, it requires a much longer period of observation to determine the relative healthiness of stations. Many causes, but chiefly the character of particular seasons, may cause a change. This is what makes daily local observations on the weather, and tables of temperature, fall of rain, atmospheric weight, electricity, &c. so valuable. If kept carefully, and with regularity, for a series of years, interesting results would certainly be obtained. But though the results of such enquiries might be very interesting, as shewing the minutiæ of climatic causes

Mortality at different stations.

Statistics not infallible.

Facts to prove this.

Ghazeepore.

Agra.

Kurnaul.

Inferences.

Value of scientific observations on the weather.

But practical sanatory measures more important.

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* In 1838 the mortality at Agra was 7 per cent; in 1839 5½ per cent; it then again fell 'till 1843 and 1844, when it rose to 5 and 3 per cent.

Because within control.

Sanatory measures.

Importance of in stations.

Suggestions.

Cleanliness, drainage, &c.

which affect health, I am not sure that much practical improvement to health could result from them. It is beyond human power to prevent the intenser heat of a particular season, to regulate the fall of rain, the weight of the atmosphere, or the dose of electricity which it may contain; but there are things which we can prevent and regulate, and to these, as practical and useful, it behoves us to bestow our particular attention. We must not think that the health of stations on the plains is becoming unworthy of notice, because the bulk of our troops will soon be perched on the sides of the mountains. Let us recollect that many Europeans, Civil and Military, must still sojourn on the plains; nor is the health of the brave and temperate Sepoy unworthy of our regard. On most of the points I here briefly allude to, I have dwelt elsewhere—good accommodation, including free space, elevation from the ground, and full ventilation, cleanliness observed to the strictest meaning of the word, comprehending absence of all rank vegetation, the removal of human ordure, and dead vegetable substances liable to decay. The most perfect drainage is always advisable, and I believe that even medical men are not yet sufficiently alive to the mischief of stagnant water in the vicinity of dwellings or hospitals. They only fear a marsh, while a puddle, if nearer, may do more mischief in a climate where heat is so intense and dead vegetable and animal matter so abundant. Dr. Jas. Ranken tells us that a bucket of seemingly pure well water will get fœtid in two or three days, by the death of animalculi. "Millions of monads are contained in a single drop of water"—*see Mantell's thoughts on Animalcules.*

I believe that at almost every Civil and Military station the sanatory measures above noticed are almost entirely neglected, nor have I much hope of seeing it otherwise, 'till those who understand the sources of disease have the power of suggesting improvements.

Public health of lay Europeans.

While I served in Tirhoot I had opportunites of observing the health of a considerable number of lay Europeans scattered over a large tract of country. The climate of that district is cool, comparatively—situated on the north bank of the Ganges, with a light, sandy, or loamy soil, in most places, it is well clad with vegetation, is free from jungle, and is generally highly cultivated. Lagoons, or old beds of rivers, and extensive rice jheels, full of water in the rains, but drying up more or less completely by evaporation are, very common. These I shall shew do not prevent the district from being a very healthy residence for Europeans. For Natives I do not believe there are many parts of India more unhealthy. The Indigo Planters lead active lives, enjoy the comforts of good country houses, and generous wholesome diet; but on the other hand they are subject to much exposure. Their appearance of rude, robust health, so different to most Anglo-Indians, and even to the Civil Servants residing at the station of the same district, was remarkable, and appeared to shew that being much in the open air is conducive to giving the constitution a high tone. I have had occasion to remark elsewhere that the most robust and healthy-looking men are not always the longest livers; (during fourteen years I resided in Tirhoot not one Civil Servant died there.) However that may be, I believe it will be conceded that the following extract from my topography of Tirhoot, proves that men can be much in the open air in India with impunity. It also, I think, shews that when men take exercise they are in the highest state of health; many of the Planters were generous livers as to the luxuries of the table. As drink, beer was the favorite beverage. The slighest excess in the use of spirits was always prejudicial, and a free indulgence generally fatal after a time. *Extract*—"The European community of Tirhoot, during the ten years I have lived here, has amounted to an average of two hundred men, women and children, in the following proportions:

Observations in Tirhoot.

Indigo Planters.

Effects of exercise.

General observations.

Extract from a topographical memoir of Tirhoot.

Males, 130. Females, 34. Children, 36.

The following is the rate of mortality for eight years, specifying the diseases :

| *Males.* | | *Females.* | | *Children.* | |
|---|---|---|---|---|---|
| Apoplexy, | 3 | | | | |
| Dropsy, | 2 | Gastro Enterite, | 1 | Pertussis, | 1 |
| Mania, | 1 | Cholera, | 1 | Diarrhœa, | 1 |
| Gout, | 1 | Dysentery, | 1 | Various diseases of dentition, | 6 |
| Fever, | 5 | Fever, | 1 | | |
| Cholera, | 1 | | — | | |
| Strangulated Hernia, | 1 | Total, | 4 | | — |
| Paralysis, | 1 | | | Total, | 8 |
| Abscess of the kidney, | 1 | | | | |
| Hydrocephalus, | 1 | | | | |
| Suicide, | 1 | | | | |
| | — | | | | |
| Total, | 19 | | | | |

"This gives thirty-one deaths in eight years, or about 2 per cent per annum ; and, though the number is too small to warrant the drawing of very correct conclusions, we may venture to state, particularly when children are included, that this climate is not very inimical to European life ; something must be given to the fact, that all the European residents, as already mentioned, live in comfort, if not in luxury. On the other hand, we shall see that many deaths have been from diseases usually caused by over repletion. The great feature of the table is, that so few of the deaths are assignable to locality."

Deductions therefrom.

On the last observation above quoted, I have now to remark that none of the cases of apoplexy were from exposure—no men in India expose themselves more, but they keep their heads carefully protected.

General inferences.

Here, then, I have given proof that in a tropical district of India, prolific in sources of disease, and such as destroy natives in numbers, Europeans may and do enjoy very good health. In fact the more we study the subject, the more we shall become impressed with the truth, that in most situations the mere local and natural agents of disease are not very active in this country, and easily opposed by human foresight and con-

Observations at Cawnpore.

trivance.* In my practice among Europeans at Cawnpore, as compared to Tirhoot, I have been struck by three things in particular. First, the much greater number, in proportion, attacked with fever; this applies to adults and children, and is not the effect of exposure—as it is often intermittent, I believe it to depend on malaria, and the ravines to be the sources. Epidemic catarrhal fever is also common: here the population is collected together, as in a town; and in consequence Europeans are much more liable to the infection of variola. This is the second peculiarity I have noticed;† and the third is the great severity and prevalence of measles among children. In Tirhoot it was almost unknown, and when it did shew itself the type was wonderfully mild in comparison.

Effects of climate on the performance of public duty.

Besides the actual deaths among Europeans in India, the effect of the climate upon the mental and bodily functions is important; and, with reference partly to the performance of public duty, mental apathy and listlessness are felt by all, but by none so much as by those who give way to them. It requires strong resolution to overcome these feelings, but the victory is a glorious one when won, for no man is more to be pitied than the Indian idler.‡ But even with the most energetic, the climate works its slow and sure effect, and leaves men in the sear and yellow leaf, at an age when in England their mental energies would be yet entire. The bodily powers give way yet earlier, but much of this too is the effect of the sedentary life which is engendered by climate, and the habits it gives rise to. The mind and body require exercise to keep them in a healthy condition.

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* It is curious to compare this state of things with what we read of the climate of the West Indies, where some of the most deadly visitations known in the world fall on the stranger alone. In the late disastrous expedition up the Niger, the blacks almost all escaped.

† A proof I think of two things, that very local and isolated spots generate miasm, and that propinquity greatly enhances the liability to seizure.

‡ Solomom says, "He that ruleth his own spirit is better than he that taketh a city."

Hill Sanataria.

It is with reference to these points that the occupation of the mountain ranges is so important a question. If the seniority system is to last, and men are to hold service as long as they choose, it would indeed be an unwise policy which curtailed the indulgence of leave to these Sanataria; ladies and children fly to them for refuge, and a wise consideration on the part of authority has left them open to the services, as far as immediate public interests will allow. I say a wise consideration—for it is always advisable to keep the mind and body of a public servant at the highest standard of zeal and efficiency.* This argument applies well to the proposed new furlough regulations, which, if taken an enlarged view of, might in course of time almost do away with a pension list. I mean that, if furlough rules were made very liberal, many would not care to retire, now that steam has brought us so near the mother country. On the present movement for cantoning the European Troops in the mountain ranges I have remarked elsewhere; no doubt it will prove a vast saving of life, and a grand improvement on the old system; but we must expect that where large bodies of men are closely congregated together diseases will spring up too. The vallies of some of the ranges are said to be very unhealthy, but I never saw a healthier race of people than the Lepchas, the natives of Darjeeling, living on the lower hills, almost in the vallies. The vicinity of that station to Calcutta gives it a great claim to attention for the location of troops.

Furlough regulations.

Cantoning troops in the Hills.

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* There can be no doubt that the seniority system is the rotten burgh of the Indian service, and that most especially with reference to the interests of the Government. If a liberal pension is given for past services, I cannot see why public interests should suffer by permitting unfit men to perform important and onerous duties—at present the private interest is studied, not the public one.

Concluding remarks.

The last observations I shall offer on European public health in India are these. It is no doubt true that the climate is inimical to European life; in fact mortality increases with heat in all countries *cæteris paribus;* and the proportionate duration of life to the early advent of puberty shews more intensity but less stability. Nevertheless, there is assuredly a great deal that can be done to ward off disease by the exercise of human foresight and intelligence. Let the fact be borne in mind by individuals, nor should it ever be lost sight of by those who have the guardianship of public health. For practical rules I refer the reader to the chapter on Hygeine.

## APPENDIX TO CHAPTER I.

I subjoin, in the form of an appendix to this chapter, some remarks on the general causes affecting public health, with suggestions for improvement, which were included in a memoir I wrote on the medical topography of Tirhoot. It was ordered to be printed, but, for reasons unnecessary to mention, I never completed it.

General observations on the public health.

There is nothing which forces itself more upon the obserservation of an enquirer into the nature and sources of diseases, than that the diseases of a community, being in some degree independent of physical and climacteric influences, have always a relation in their extent and in their nature to the conventional condition of a people. A division of diseases might thus be made into those which have their sources in poverty, immorality and ignorance on the one hand, and those which arise from luxurious usages as to food, over indulgence of the passions, too much mental anxiety, and too little bodily occupation on the other; and yet, alas! there is a third class of diseases, incidental to all classes of society, attending upon our race in all climates and all localities, visiting the tenant of the hut as well as the lord of the castle.

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* Dr. Ranken, comparing the climate of India with that of England, wrote as follows: "Nor am I certain that the mere temperature of the one is more inimical to health than that of the other. The salubrity of either depends much, perhaps principally, on the judicious counteraction of inevitable evils."

Physical causes affecting public health.

The causes which determine public health, I divide into physical and moral, comprehending under the first head the influences of the external operations of nature, such as vicissitudes of temperature, heat, cold winds, malaria, &c. and under the second those social and moral peculiarities, habits, and institutions which affect the health of a community. The physical causes that prove injurious to the public health in Tirhoot are, as will be guessed from what has been said in the former parts of this memoir, sudden changes from heat to cold, and vice versa, bad drinking water, and exposure to the influence of malaria. This last cause is indeed the great source of disease, acting of course more or less virulently, according to different remote causes, and producing, according to the modified operation of such causes, fevers, dysentery, cholera, &c. It is moreover to be observed, that in situations where the cause of malaria is very concentrated, we have to expect that the community, as a mass, are of less robust health than people in more salubrious localities; and hence we may expect that not only epidemics, but sporadic diseases, as they arise from their own peculiar causes, will prove more destructive to life. This is undoubtedly the case, as will no doubt admit of proof when medical statistics are more attended to than they have yet been in India—vicissitudes of temperature, as might be expected in a damp climate like Tirhoot, produce frequent catarrhal epidemics. These are most frequent at the commencement of the cold weather, and again at the setting in of the hot season. I have never but once seen these visitations amount to what is usually called influenza. The sudden changes of temperature also add power to the activity of malaria. Indeed some authors hint at malaria being nothing but this, that in fact the localities where an active poison is supposed to be generated, merely act by producing more sudden changes of temperature.* To this I cannot subscribe, for we know that human effluvia produce fever—and why not vegetable too? Since writing this, I have seen it cursorily mentioned that a Dr. Smith has proved the existence of the specific, poison by direct experiment.

With regard to winds, the usual observation holds good that westerly wind is more healthy than an east wind, with this exception, I think, that, just before the rains set in, Cholera seems more frequent, when strong hot winds are prevailing. When west wind prevails, at the end of the rainy season, the country dries up so rapidly, that it seems to put a stop to that decaying process which produces miasm; or is it that malaria, whatever it may be, (and of its specific nature we are yet ignorant) floats in moisture, and becomes diffused in a dry atmosphere? In a west wind, a wound will heal much more quickly than during an east wind; this I have had frequent opportunities of witnessing after surgical operations. The effects of drinking bad water are more prejudicial to the public health, than I suppose is generally conceived. It is seldom purified by even the higher classes, and, when impregnated, as much of it is, with vegetable impurity, it produces dysentery, and I firmly believe remittent and intermittent fevers also. Stone in the bladder is clearly a prevailing complaint in Tirhoot, and it is very generally supposed to arise from drinking bad water. I have ventured to express, in a former part of this paper, that in my opinion the use of saline water is the cause of Goitre. When I professed my opinions as differing from Mr. Bramley's upon this subject, that gentleman was yet spared to the useful and noble institution, which has since lost his valuable services.

Moral causes affecting public health.

In the social customs and moral habits of the natives of Tirhoot, we have what we may call the predisposing causes of

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* I have of late seen it noticed that the marsh miasm has absolutely been proved by chemical experiment to have an actual existence, producing the effects which have been so long assigned to it, when made by the hand of man. To what depths of Nature's mysteries is not science likely to penetrate!

Public health.

disease, those which I have classed as physical being the exciting causes. To illustrate this familiarly, we have only to observe the difference in the health which Europeans and Natives enjoy in Tirhoot; the former having different habits, and social customs, are undoubtedly less prone to the endemic diseases of Tirhoot, though they are exposed to the same physical influences. I must content myself with a few general observations on this head. The great mass of the population live upon a vegetable diet: this, though it makes them less liable to inflammation, increases a proclivity to dysentery, cholera and fever, arising from marsh miasm. Anticipating the possibility of being thought theoretical, I think it reduces the power of the general fibre, aud thus in diseases of mere congestion reaction is more feeble, and in those of debility the vital powers are less. Mussulmans who live upon animal food in part, enjoy better health, and resist disease better. I am aware that the above opinions are opposed to those of many writers on Indian diseases; the truth I suppose lies, as in most cases, between the extremes. Nature, the goddess whom every observer ought to worship, speaks for herself. Will any man deny that heat does not sometimes exhaust, nay almost overwhelm, the vital powers? and what is the effect of a moderate stimulant to renovate exhausted nature? In other cases, again, and under different circumstances, the effect of heat is directly stimulating, and depletion is our remedy. But I am wandering from my subject; and, to return to it, remark again that the effect of vegetable diet seems to me to be to increase the liability to some diseases, whilst it undoubtedly wards off others.

Remarks on the general causes affecting it.

I next remark upon the clothing and habitations of the natives. Their clothing is well adapted for a hot climate; but, at the sudden changes, and during the cold season, much sickness arises from its being so light; and the laboring classes in the rainy season work in their fields without any covering, when the rain is sometimes coming down in torrents. In their houses, the natives, as a body, pay little attention to comfort or cleanliness; and in the site of houses and villages, health has no consideration bestowed on it. They, on the contrary, usually make choice of a spot near water, the very worst in any climate, especially in a tropical one.* The natives, at some seasons of the year, sleep out of doors, lying on the bare ground, with only a thin sheet to cover them. Natives are usually considered to be of cleanly habits; to that opinion I cannot subscribe, when I consider the great numbers of them that labor under diseases of the skin. The women's diseases, we know and hear little of; but, as strictly sexual, we may infer, from their early marriages, that they will be more the diseases of debility and relaxation,† than those of an opposite nature to which the female is prone in European countries. The Hygeist must look upon the early marriages in Asia, and the opposite custom in Europe, as both unfavorable to public health. It will be seen, from the above cursory observations on their causes, that the diseases of the natives of Tirhoot are generally those of a primitive people, ill-clothed, ill-fed, ill-housed, and unacquainted with the comforts, much less with the luxuries, of civilized life. These truths are of course not universally applicable, for some of the population indulge freely in gastric excesses and in others, especially the mussulmans, to which it is sufficient barely to allude. The consequences are that gout, (or something very like it) apoplexy, paralysis, and general and early constitutional decay, are to be met with. We also frequently meet with shattered forms and constitutions, the effect of opium, or of the indulgence in the use of other narcotic drugs, such as ganjah or bhaung. To the same causes we may attribute many cases of epilepsy and insanity. Natural idiotcy is extremely common, and few of these unfortunate creatures are exempt from the Goitre—a fact favorable to the opinion that exposure of the neck produces it. Hernia would seem a rare disease in this country, which seems singular, when we consider the effects of heat in producing relaxation. The manner in which the natives bind themselves up round the loins, &c. may perhaps account for the rareness of ruptures. Opthalmia is prevalent, in the hot months especially, shortly before the rains have set in; and blindness is a very frequent consequence.* Congenital and other forms of cataract are often to be seen. The diseases of infantile dentition carry off here, as elsewhere, numbers of children. Retention of urine is by no means unfrequent, if I may judge by the number of cases I am yearly able to save from death, by the use of the catheters; stricture and enlarged prostrate are the causes of retention. There is one disease I have often met here, and which has not met my observation elsewhere: I allude to a kind of diabetes, which is attended with almost all the symptoms of the true diabetes, where sugar is secreted; but it differs from it also, in being curable by a change in diet, and by the exhibition of medicines, to improve the state of the digestive organs. I have met with one case of genuine dry gangrene; and I am inclined to think further observation will shew that the diseased grains in this country will sometimes shew a kind of ergot, and that will I suppose produce the dry gangrene. Other writers have stated that a permanent contraction about the knee joints is a frequent consequence of eating some kinds of kodoo, the paspalum frumentaceum: numbers of people so affected are to be seen here. Children are subject I have been told to the trismus nascentium, and it usually attacks on or before the sixth day. Hydrophobia is very common.

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* A great source of unhealthiness is to be found in the stagnant pools existing in most villages, and especially in the larger towns; they were originally places from whence mud is taken to build houses, but get filled with all sorts of nastiness, and might be called cess pools.

† I have treated many cases of diseased mammæ and ovaria among them.

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* The contagious conjunctivites so common here and at Dinapore, I do not recollect seeing in Tirhoot among Europeans—1847.

## SUGGESTIONS TO IMPROVE THE PUBLIC HEALTH AND THE SYSTEM OF MEDICAL POLICE.

If I thought that what I have to say upon this subject would meet with much attention, I should consider this by far the most important part of my essay—for what can exceed in interest, and importance to humanity, that branch of police which has for its object measures for the improvement of public health; or the consideration of the institutions, domestic and moral habits, of a people? As they affect the same subject, I shall merely allude to the latter, although they affect the public health of a community more than can be well appreciated, unless we go deeply into the subject. The physical causes which operate on the health of the natives of Tirhoot, are those which I purpose chiefly to notice. They are capable of alteration by physical and municipal operations; the others we must only expect to remedy, by changing the moral condition of the population.

In this rich and populous tract of country, where medical aid is only available to one out of thousands of the population, (this is no figure of speech) measures of a general nature to avert disease become greatly more necessary; yet have such measures received very little attention up to this time. I cannot do better here than to quote the following judicious observations from one of the Medical Board's circulars: "this view of the subject cannot fail to remind the Medical servants of the Honorable Company, of the peculiar value and applicability of the preventive branch of their profession, hitherto almost neglected in India, where, by discovering the sources and agents of insalubrity, and shewing how to remove them, it appears possible to avert more human suffering than can be averted by the apeutical treatment, after accession of illness."

I shall endeavour, at the risk of some recapitulation of what I have written elsewhere, briefly to point out the most common sources and agents of insalubrity, and then venture to suggest such means as may seem feasible for their removal.

The sites chosen by the people for their habitations, are often almost the worst they could fix upon—namely the vicinity of stagnant water. There we have the decay of vegetable matter producing miasm,* and the atmospheric influences are more noxious from the greater abundance of moisture. A good many of the houses of the European residents in Tirhoot have been built in similar localities, on the sides of the fine horse shoe lakes, in the vicinity of the little Gunduck already alluded to. I have from extensive observation been fully satisfied that such localities do affect health injuriously,† as has been seen by me, more especially with reference to the servants employed by the European residents. The European himself, living in a good house, sleeping high from the ground, and surrounded with comforts, more usually escapes. At various spaces between the huts in native towns and villages, we find deep pits, from which the earth has been dug to form walls for the houses. These fill with water in the rains, which dries up by the slow progress of evaporation ; and such places, as might be expected, teem with animal and vegetable life, some of it dependent on water for its existence ; so that, after a certain stage of evaporation is passed, their death produces animal and vegetable combinations, the undoubted sources of fever and dysentery, and greatly aggravating the virulence of all epidemic visitations. We have next to notice the heaps of litter and filth left in the immediate vicinity of every native village, in fact surrounding the door of every hut. The roads around every hamlet, and the interspaces between the houses, abound with luxuriant vegetation producing mischief in decay, and checking the free current of the atmosphere.

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* Of course the cleaner from weeds such stagnant water is kept, the less likely is it to prove pernicious.

† As do also sluggish running streams, on the banks of which many Europeans' houses and native villages are situated ; to give them a run of fresh water through them, and to clear them of vegetation, are the obvious prophylactic indications.

All these causes not only induce individual disease, but render epidemies more virulent, as well upon any one person attacked, as with reference to the numbers it will seize upon. The wells from which the inhabitants drink, are often left full of rank weeds, and are also frequently impregnated with saline ingredients. The habitations of the people are often damp, on a level with the surrounding soaked ground, and the current of air through them very much obstructed. Lastly, the food of the people, as we might expect, and as we cannot hope greatly to remedy, but by raising them above their present condition, is what the occasion offers, not what prudence or judgment dictate.

I am led by every consideration to believe, and it has indeed been distinctly stated in several parts of the public correspondence referring to these reports, that a chief object Government had in view in ordering the preparation of them, was, that it might see the real condition of the people, and adopt measures for ameliorating that condition, if necessary. Writing with this impression, and confining my views to what is within my own province, I shall speak my opinions freely. That the condition of the people, in reference to their health, admits of amendment, is beyond question. After a local experience of ten years in Tirhoot, I am enabled to state that from the sources pointed at much loss of life arises. In the hot weather small pox, cholera, and remittent fevers prevail; in the rains the same affections, with less of the two former, and more of the latter; at the breaking up of the rains, intermittents, congestive remittents, dysentery, and cholera, are most rife, and from these causes a general effect upon the health of a population also arises, which it is difficult to appreciate, but by principles of general reasoning. The measures necessary to be adopted are simple enough, and they could be made to insure at least a partial removal of the causes of sickness which have been enumerated. They are nearly embraced in the word conservatism, but the difficulty is how to put these measures into practice. We have to combat the indifference of the people themselves to such measures, and we want in a great degree the municipal institutions, upon which to engraft them ; neither can we hope, in the present state of things, that the police establishment can be made available. We have lately seen a committee of experienced and talented men record their deliberate opinion that the police establishment is held in dread and detestation by the body of the people, a fact known to every impartial observer in the Mofussil. To give power to such an establishment to interfere with the people's domestic economy and private habits, would only be arming it with more ability to extort and to oppress. If then Government is anxious to encourage the native population to habits of such a nature as will remove the causes of disease, it must be by organizing a system which will win for the police the affections, or at least the confidence and co-operation, of the people ; or by framing a scheme especially for the improvement of the public health. The situation which I hold, and the length of my service as Police Surgeon of this district, entitle my opinions to some weight. Speaking of the police as the organ for the maintenance of public order, and the protection of life and property, as well as to prevent that very organ from itself becoming the means of oppression and corruption, I am decidedly of opinion that no system will ever work well, unless we have more European agency, and that ought to be in the interior of districts. The natives themselves trust more to European integrity, and that is of itself one good reason why that agency should have a preference. Experience has taught me how much the names of some of the functionaries who held the magisterial authority in the district, are borne in reverence by the natives, and how individual ability, energy and decision, have sometimes mastered the defects of the present system.* It would seem that from the past history, as well as from the present condition of its inhabitants, a military police is of all others best suited to India; for by it do we most awe the malefactor, and hold the machine with which we are working in the most manageable condition. But the great desiderata are, more European agency and a division of districts.

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* The natives hold in especial reverence and awe the name of Mr. Moore. It is a common saying among them, that if a cat

The adoption of these would I believe lead to the following results: having a limited jurisdiction, the magistrate would be able to make himself acquainted with its localities, and with the character of its inhabitants; in all cases requiring it, he could make the necessary inquiries on the spot, and his vicinity would check extortion and corruption on the part of his subordinates; the people would be saved the immense loss, expense, and inconvenience of travelling a long distance to the Court. Such are a few of the advantages which would arise, and if the change were made, I am sure we would not long see the present frightful abuses existing; we would not hear of murders committed, the knowledge of which has never reached the magistrate; we would not have outlaws walking abroad, and setting the police authority at utter defiance; we would not have the thieves of the district living protected by the police, and receiving black mail from a great portion of the people; we would not have parties of armed men fighting battles against one another, the police never interfering till the mischief has occurred, though long cognizant of the certainty that it would occur. These are things which are, and have been taking place in Tirhoot. I do not think they would occur with a system of police, such as I have recommended, and I am very sure that such things ought not to occur under an enlightened Government.

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stole milk he would find it out, and bring the delinquent to justice. However little it reaches the ear or the eye of authority, there is no country where the acts of public men are more discussed. Mr. Braddon is also spoken of with reverence and affection by the natives, as well as the late Mr. Augustus Prinsep.

On the system of police above noticed, rules of medical police and village conservatism might be engrafted; but I confess, that I never expect much will be done in the way of improving public health in India, unless the Medical Officer has some power in executing as well of suggesting measures of improvement; because the natives are themselves unaware of their importance, and because any other officer can never be impressed with a full sense of their necessity. A medical man is alive to the deep interest of the subject, and has a full knowledge of the means necessary; and he ought at the very least to have the power of getting others to execute his instructions. I have grounds for saying that the mere suggestion of conservative improvements by the medical officer will not be likely to produce much good. Since I have been Civil Surgeon of Tirhoot, there have been a great many gentlemen in the office of Magistrate, to whom I have suggested from time to time various measures of a nature likely to benefit the salubrity of the station. Truth compels me to state that I have never received any thing like encouragement to make such suggestions—on the contrary,* I have been always led to feel that they were looked upon as an annoying interference. The state of this station, as it will be described ,in the last chapter, will prove† that my suggestions have not been acted upon. That I did suggest I adduce one proof of in a letter appended. It has often seemed to me surprising, that, while the scarcity of European agency is an acknowledged drawback to the good and efficient executive government of this country, the services of the Civil Surgeon should not have been applied to other duties than those merely of a strictly professional character, the latter being on most occasions such as scarcely to occupy an hour of his time daily. The Judge, the Magistrate, the Collector, and the Assistants of the two last, when they have them, are avowedly overwhelmed with duty; whilst the Medical Officers well educated, of mature age, covenanted to Government for zealous and honorable service, and generally experienced in the country, is left with scarcely any duty at all. He might surely with great propriety relieve the Magistrate of the detail of managing the internal economy of the jail, a subject with which he must be more conversant, and he would in this way, I feel quite sure, greatly improve the health of the prisoners. If he had the control of the labor of the convicts, subject, if need be, to the magistrate's supervision, he could at once adopt such measures as his judgment suggested for improving the salubrity of the civil station, and its vicinity, and he would have much more time to look after their labor on the roads, than the Magistrate can possibly have. But this is not the only branch of public duty for which I think the Civil Surgeon might be employed, with advantage to the public service, and to the furtherance of the objects of good police, a knowledge of the statistics of the country, and improved general health. The investigation into all matters which are embraced by the office of Coroner in England, might, I think, with very great propriety, be made part of the duties of a Medical Officer.* It may be said, without disparagement to the civil service, that its members, even the most experienced, cannot have much knowledge of medical jurisprudence, an intricate branch of law and medicine which is made part of the education of a medical man. To the above duties might be added with great propriety the task of keeping registers of births and deaths, and the collecting of various medical and statistical facts. It is in vain to look for these from a separate department, merely directed in a general way to furnish them, as is proved by what has occurred to me, and by what I am aware makes my report much less valuable,—I allude to my having been unable to furnish any statistical tables as to the imports and exports, the productions, &c. of Tirhoot.

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* Since this was written, eight years ago, Deputy Magistrates have been appointed, and some of them located in the interior of districts. The next step will I hope be to appoint a Sub-Asistant Surgeon to each subdivision.

† After this was written, Mr. E. Samuells, an officer of great talent and energy, was Magistrate of Tirhoot, and made great improvements in the civil station of Moozufferpore, by which no doubt public health has greatly benefitted. Of the other benefits he conferred on Tirhoot it is not my province to speak; acknowledged one of the first Magistrates in India, yet, by the present system which prevails, his talents are now lost to that branch of the public service.—*Note in* 1847.

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* I was once asked, when being examined on oath by a Sessions Judge, whether by the extensor tendons of the fingers I meant the Tendo Achillis.

We are told much of the objection of natives to furnish information, but there is a fallacy here. It is not because they object to give the information, but because it has been sought for in the most objectionable manner.

Mr. Adam had had no difficulty in acquiring the information he wanted on the subject of education; and the indefatigable Buchanan went so far as to know how much milk the cows gave in the districts he visited, independent of what was taken by the calves. In the same way we are told of the native's apathy and want of public spirit in matters of general improvement and charity. I know well that the fault partly lies in not calling forth and encouraging that public spirit.* Let the lead but be taken, and the impression given that their acts will be approved by Government and its servants, and the natives I feel sure will not be backward. These acts once set a going, example, and the visible good effected, will soon have their due influence. The servants of Government are the people who ought to take the lead in such matters; and their own motives in doing so being pure, they need never fear that undue motives will be imputed. In this way might schools be founded, roads made, and dispensaries established.

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* At Durbungah, three years ago, a frightful outbreak of cholera and fever took place, by which thousands of the people perished. The filth and impurity of that place is not exceeded by any thing in India, yet there resides one of the wealthiest natives in this part of the country. At the time of the above occurrence, I wrote to the magistrate on the subject of improving Durbungah; but I am yet ignorant whether any thing was done.

In concluding this branch of the subject, I wish to make prominent mention of what I consider a very great hardship in the present operation of the police laws. I allude to the cruelty and danger of carrying wounded persons, however dangerous their cases, and at whatever time or season, and sometimes from immense distances, for the report of the Civil Surgeon. I have met with numerous cases where the innocent plaintiff in a suit has suffered great danger and even death in consequence. Even after they reach the station, they are without accommodation or treatment, few of them ever consenting to the supposed disgrace of going to the jail hospital.*

### NOTE TO CHAPTER FIRST.

In the chapter on public health, taking a very general view of the diseases to which the natives are subject, I have stated as the result of my observation, that diseases of the arteries are rare; since that time, I have seen Dr. Webb's Pathologia Indica, in which he records a contrary opinion. If it shall appear that his view of the subject is correct, it will only prove the accuracy of the general doctrine I endeavoured to inculcate, that the more native diseases are studied, the more will they be found to assimilate with those of Europe. I have been more than twenty years in India, have always made myself accessible to the natives for advice, and yet I have never seen but one case of external aneurism: therefore, I still hold my opinion, that the disease is rare; I believe that I may say that it has been almost unknown in the records of the Native Army, of more than a hundred thousand men. I only recollect one recorded case, and that was at Madras; the operation was performed successfully on a Sepoy for popliteal aneurism.* The subject is curious, if we consider the violent exercises and contortions of the limbs of some of the natives of India.

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* I see that nine years after the above was written, the head Criminal Court has ordered the probing and cruel examination of wounds by the police to be discontinued: I fear that the evil I have pointed out is still in existence—1847.

Dr. Webb's remarks on Scrofula remind me that I omitted to mention having often seen it, and that too in the form which he states he has so rarely met with—swelling and ulceration of the glands of the neck.

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* I have since seen a record of another case of popliteal aneurism in a Sepoy which was successfully operated on at Chittagong by Assistant Surgeon A. Macdougall many years ago.

# CHAPTER II.

## CLIMATE.

Topography.

The limits of a single volume will not admit of my giving any thing like a lengthened topographical description of the immense tract of country, the climate of which I am about to describe. It extends in a S. E. direction from the banks of the Sutlege to the Bay of Bengal, and it is bounded on the north side by the great mountain chain of the Himalayahs, to the south by the smaller range, an off-shoot of the Vindhyan mountains, which run parallel to the Ganges from Rajmahal to Allahabad, and then diverge southward into Central India.

Boundary.

Recent events, at one time so critical but having ultimately so glorious a termination, have now indeed extended the British boundary beyond the banks of the Sutlege ; and the Beas river is now the limit of our possessions in that direction. Of the newly acquired territory lying between the Beas and the Sutlege rivers we know little by experience ; but as it is further from the equator than any other part of our possessions in Hindoostan ; lies close to the Hills, without whose cooling influence the interior of India would be uninhabitable ; has a sandy dry soil ; is well cultivated and drained by water courses ; and has a fine, healthy race for its population,—we may safely infer that it will prove healthy.

Newly acquired territory.

From the Sutlege a dry, open, sandy plain extends to where the Jumna first, and the Ganges a little way below, debouche from the mountains. These two great rivers run almost a parallel course to Allahabad, receiving the waters of numerous tributaries that pour from the Hills on either side ; and at

Jumna and Ganges.

Allahabad the Jumna yields its name and its waters to the majestic Ganges. Along the right bank of the Jumna lie the provinces of Delhi, Agra and Bundlecund. Between the two rivers is the Doab, comprising the districts of Saharunpore, Meerutt, Allygurh, Furruckabad, Mynpoorie, Cawnpore and Allahabad. On the left bank of the Ganges the districts of Rohilcund and the kingdom of Oude extend. The remaining provinces of the N. W. Presidency spread their great level plains along the Ganges till it flows into Behar, as it receives the waters of the Soane on the one side, and those of the Dewah on the other. Benares, Ghazepore, Azimgurh, Jounpore, and Goruckpore, lie between the left bank of the Ganges and the great Nepaul forest, a deep belt of jungle extending along the foot of the hills, from where the Ganges reaches the plains down to the banks of the Burrumpooter, familiarly known as the Terai, and on the right bank Mirzapore and parts of Benares and Shahabad run up to Vindhyah chain of hills. Through these districts a still greater number of streams meander, fertilizing and draining the country in their course.

North west provinces.

Provinces below Allahabad.

The districts of Chupra, Chumparun and Tirhoot on the north side of the river, and of Patna, Gyah, Monghyr and Bhaugulpore on the south, the three latter being intersected in many parts by low ranges of hills, form the great and fertile province of Behar.

Province of Behar.

There remain the immense alluvial plains of Bengal, bounded on the north at Rajmahal by the confines of the Bhaugulpore district on the opposite bank, defined by the line which separates Tirhoot and Purneah, stretching east to the mountains of Sylhet, west to the Vindhyan chain. and on the south spreading their low flats into the Bay of Bengal. The whole of this great province may be said to form an immense delta—low lying, and comparatively swampy, it is intersected by many rivers, which communicate by smaller channels, and as we approach the sea the great labarynth of the Sunderbund is formed,

Of Bengal.

a wonderful series of creeks and islands, running from the mouth of the Hoogly to that of the Ganges, that river having in the mean time mingled its waters with the Burrampooter, after the latter emerges from the great valley of Assam;—united they take the name of Megna. A little below Rajmahal the Ganges gives off from its right bank, first the Bhaugaretty, and next the Jelinghee, which flowing through Burdwan, Moorshedabad and Nuddeah in separate streams, unite to form the Hoogly, the grand navigable arm of the Ganges, which flows to the sea through Baraset, Hoogly and the 24 Pergunnahs.

Returning to trace the Ganges from Behar to the sea, we have on its left bank Purneah, Dinajepore, Maldah, Rungpore, Rajeshye, Rampore Bauleah, Bogra, Pubnah, and Dacca; and between its right bank and the Jelinghee, Comercolly, Jessore, Furreedpore, and Burrisaul.

General features recapitulated.

Thus, from the banks of the Sutlege in the 31st, to the extremity of Bengal in the 22nd degree of north latitude, the various districts which compose the Bengal and North West Presidencies present the general feature of great level alluvial plains extensively intersected by water courses that pour their contents into the great centre floodgate or reservoir of the Ganges. With some limitation, they all enjoy the same changes of season, temperate and almost continued fair weather, after the rains break up, in consequence of the sun's greater distance, till the beginning of March, when the great luminary again approaches and the hot season commences; then there are four months of ardent dry heat, followed by a rainy season which soaks the soil with moisture, produces luxuriant tropical vegetation, and more or less inundates the lower levels of the lands.*

Features of climate held in common.

Particulars in which the physical climate

In the following particulars, however, there is a marked difference in physical character between the two extremes of differs in various parts of the country.

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* From what has been said of the distinguishing features of the climates of the Upper and Lower Provinces, we draw the conclusion, that the combination of heat and dryness is characteristic of the climate of Hindoostan and a union of heat, moisture characterses, that of Bengal.—*Dr. Finch.*

Peculiarities of Bengal.

Of the north west.

the vast tract of country of which I have offered so imperfect a general description: the prevailing winds, the fall of rain, the quality of the soil, the level of the lands above the water, the state of vegetation—all these things differ greatly at the two extremities, the differences becoming less marked from either as we approach the centre. The winds blowing up the Bay of Bengal and prevailing in the lower provinces, are saturated considerably with moisture; rain falls there in great abundance, about seventy inches in the year; the soil is alluvial, low lying, greatly intersected with various receptacles for water, and covered with verdure; the vegetation is rank and luxuriant, and the rays of the sun, being vertical, strike with great intensity on the earth—but the heat is modified by the other circumstances mentioned. Far to the North West all is to be found the reverse of this; the winds are dry and parching, the fall of rain is scanty and less regular (scarce twenty inches fall on an average on the banks of the Sutlege), the soil is less alluvial and more dry and mineral in character, the rays of the sun fall more at an angle, but this is counterbalanced by the scanty vegetation in the hot months, and distance from the sea. In the rains, however, vegetation progresses with perfectly wonderful rapidity; the land generally lies higher above the level of the water courses, but to this there are many exceptions, and it would be a great mistake to suppose that there are no inundated lands in the Upper Provinces. It is only in comparison they are less, and in comparison also that fewer suffer from them; for, besides the mere rain that falls on the plains, the inundations are produced by the swelling of the rivers, having their sources high on the mountain ranges.

Local peculiarities.

Before proceeding to the particular subject of climate, I may mention, that besides the circumstances noticed as producing different effects, there are others which act locally and peculiarly.

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* Humbolt, in his beautiful essay on climate, has shewn how the isothermal line is changed by various circumstances, independent of mere latitude.

The vicinity to the high range of mountains and to the great belt of forest running along their foot, has a cooling effect upon all the districts on the north bank of the Ganges. On the south bank again, the low, dry, rocky hills of Gyah, Monghyr, Bhogulpore, Shahabad, Mirzapore, and Bundlekund must raise the temperature. The character of the soil too has considerable influence—light, sandy and loamysoils do not appear to reflect so much heat as those of a clayey character, and they are usually more clad with verdure. In this respect too the north of the Ganges has the advantage, if not with respect to health, certainly with regard to coolness.

The peculiarity of the outlets and reservoirs for water is also important to notice, constituting in other words the state of drainage of a country. We may enumerate rivers, the smaller running streams, nullahs that fill by the rise of rivers, and only partially empty on their fall, lakes, chowers, or natural basins for the reception of water, and rice jheels. On the banks of large rivers the land is usually high, and even in places where they overflow their banks, when the inundations subside, the waters run off, little remaining stagnant. The districts on the south side of the Ganges have the best natural drainage, the water courses are deeper and straighter, the wells lie deeper; in other words the percolating water is farther from the surface, a circumstance supposed favorable to health. On the north bank, and especially in parts of the country near the Terai, the soil is very damp, the water lying near the surface;* and it is here, as in Goruckpore, Tirhoot, Purneah, Rungpore, &c. that we have all the varieties of water courses I enumerated a little way back, besides numerous running streams, many that run in dull meandering course, and in addition lakes, chowers, and rice jheels; most of these fill by the rise of the rivers, but retain immense quantities of stagnant water, which percolates, or dries off by evaporation. These circumstances give the districts just named a climate liker Bengal than those opposite (on the southen bank) which on the other hand come nearer the character of the Upper Provinces as to heat and dryness. Having thus sketched in a very general way the topographical peculiarities of the country, I proceed to offer a description of the climate and its effects.

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* So abundant is the moisture of the bases of the first range of hills (the Terai,) that some people are led to believe it to be actually lower than the country nearer the Ganges; the deception is caused by the great number of springs and the slowness with which their water drains off in shallow rills before they unite into larger streams.—*Dr. Butter.*

Climate.

Definition of climate.

The word *climate* is not so easily defined as it is understood, but the physical properties of the soil and of the atmosphere, as they affect animal life, or more particularly the human constitution, give its character to the climate of a country. To those who would study the philosophy of the subject, I would recommend the admirable work of Sir Jas. Clarke. I purpose to deal with the subject practically, and my remarks apply to the climate prevailing in the great plain* through which the Ganges flows, on which subject the excellent work of the late Dr. James Johnson, particularly the edition to which Mr. Jas. Martin has added many valuable observations, may be profitably consulted; but these latter authors chiefly treat of the climate of Bengal Proper.

Three grand divisions of climate.

The grand features of its high temperature, and its low lying, and level surface, give a general character of sameness to the climate of the vast valley of the Ganges; while other circumstances as naturally seem to admit of its division into the humid climate of Bengal, the arid and dry one of the North Western Provinces, and what may be called the comparatively temperate climate of the provinces of Behar, moderately exposed on the one hand to the furious blast of the hot winds, and escaping partly on the other the excessive inundation, and the close, sultry damp which in the rains and hot months prevail near the great estuary of the Ganges, and at all times give a peculiar character to the climate of Bengal Proper.

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* "The plain of the Ganges, outstripping Mesopotamia in fertility."—(*Aleson's History.*)

Agents forming climate.

The principal agents which operate in the formation of climate are, first, temperature, depending upon geographical situation and other causes, as so beautifully illustrated by Humbolt, Lyell, and others; secondly, the fall of rain; thirdly, the level of the land modifying at it does the operation of the two causes first mentioned; and, fourthly, the prevailing winds. By the varied action of three of these agents we have four very distinct seasons in Bengal—the cold season, from the 1st November to the 1st March; the hot season, from the 1st March till about the middle of June: the rains, from the middle of June till the end of August, or middle of September; and the drying up months, September and October.

Division of seasons.

The traveller from another country visiting Bengal,* and more particularly Behar, and the North West Provinces from the 1st November till the 1st of March, will have little to complain of, even by comparison with the finest climates of the earth. The rivers have fallen within their banks, and rank, tropical vegetation has ceased for a time. The temperature is moderate, ranging from 50 to 70.† with usually a cloudless sky, and a calm, still atmosphere; he nights are cold, making warm bed covering essential, and even during the day woollen clothing is not only pleasant but advisable, on the score of health; gentle breezes blow during the day from the east or west, usually from the latter point, when the weather is always sensibly colder than when the wind is easterly. The nights are usually calm, when heavy dews fall, especially in Bengal Proper and Behar. Fogs are common in the mornings in the Lower Provnces, but in the Upper Provinces a fog is almost unknown, some days of east wind usually bring cloudy weather, heavy rain occasionally falling for a day or two, and more com-

Cold season.

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* I am of course here treating of the climate of the country generally.

† In Calcutta, says Dr. James Johnson, the average heat of the day in November, December, January, and February, is 71 degrees.

monly at Christmas week than at any other time. This is followed again by the same serene and beautiful weather, giving us, as I have said, a climate equal to any other in the world. We have in fact for at least four months, or one third of each year, a climate temperate as to the range of the thermometer, and wanting as to the other causes which constitute climate in any source of disease.* It is true that slight affections of the air passages do attack Europeans during this period, and that natives are subject to pulmonary disease in a much greater degree than is usually supposed; but upon the whole the measure of health is great with all classes. We are told that in former days the remaining European residents of Calcutta used to hold a sort of jubilee in each month of November, expressive of their joy, at having escaped from another year's ravage of disease, so in a smaller way the setting in of each cold season is looked upon by every European as a source of rejoicing;†—he has escaped the risks and discomforts of another hot weather and rains, and he has four months of beautiful weather before him, when out-door exercise and recreations are healthy and agreeable if the one precaution be adopted of keeping the head well protected from the sun. In treating of the climate of such a great tract of country, our remarks must of course be considered to have a general application; but I will mention here that the further north west we go, the longer is the cold weather, and the lower the temperature at that season. As we approach the sea, on the other hand, the rains are heavier and of longer duration, the heat is less intense, but more continued, and the cold is more moderate and lasts a much shorter time.

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* No heat and moisture to make vegetation produce malaria. and no cold sufficient to depress the vital powers, or to act directly on the lungs.

† This is curious, with reference to Mr. Martin's tables shewing that most deaths occur in the cold months. It could not have been so formerly.

Hot season.

From the beginning of March the heat of the sun during the day sensibly increases, but this month is still very pleasant, with cool nights and a refreshing morning breeze. In the lower provinces of Bengal and Behar the wind is changeable, alternating from east to westerly but in the Upper Provinces strong westerly winds blow during the day and become violent towards the afternoon. These winds well known as the hot winds of the Upper Provinces, give peculiar character to the hot season as far as they extend, and in this last respect there is considerable difference in some years as compared with others. They extend in some seasons over the whole of Behar and continue for a month or six weeks. In other years again, the south east monsoon appears to set in earlier and stronger, and east winds will prevail over Behar for the whole of the hot season, from Benares upwards the hot winds usually blow with great regularity from March till the rains set in ; dust storms and occasional north westers* being the only change. Nothing seems more difficult of explanation than the difference of physical property between east and west wind, when we consider that an hour of time will produce that difference, the west wind dry and parching, the east, damp and relaxing.

I think I have observed that the wind which is most common in a particular part of the country is also the most healthy : for instance, that in Tirhoot a year with most east wind will be the healthiest, and that in the Upper Provinces the reverse will hold good. In April and May, and the first half of June, we have the regular hot weather, the thermometer even in doors, ranging between 85 and 95,* and the short nights almost as hot as the long days ; when no wind blows the heat is almost unbearable. This is the usual season of cholera; occasional dry dust-storms, or north westers with rain, occur during these hot months; and when all nature seems literally gasping and burnt up, the rains at length set in about the middle of June, continuing usually with great regularity† till the end of August, and often for the half of September. The moist state of the atmosphere, the cloudy weather alternating with bright sunshine, the sudden falls and rises of the thermometer, and the inundated and saturated state of the ground, with *wonderful rapidity* and rankness of vegetation, characterize the rainy season. After the clouds of the monsoon disperse, and the rains cease, the sun is yet intensely powerful, and the ground is covered over or highly saturated with water. This is what I have called the season of drying up, extending over the whole or a part of September, up it may be said, till the 1st of November, though of course all seasons are not perfectly the same, but the regularity is upon the whole wonderful. This then completes the circle of the twelve months, and I will sum up briefly. A moderate temperature, with a pure bracing atmosphere, prevails from 1st November to 1st March; this is our cold weather. In March, April, May, and about the half of June, ardent dry heat‡ is the leading feature of climate. In the rainy season, from about the middle of June till the end of August, or middle of September, the atmosphere is moist, and there are great and sudden changes of temperature, consequent upon the falls of rain, and the cloudy or clear state of the atmosphere. The winds also are very uncertain and variable at this time, and greatly affect the temperature. The state of the country with

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* Frequent falls of rain in the hot weather especially with much easterly wind, observation has led me to think are followed by disease especially in the Upper Provinces where they are least common.

In the hot winds by the use of tatties houses can be kept comfortably cool. This is esteemed the healthiest part of the hot seasons ; exposure often produces apoplexy.

Rainy season.

Season for drying up.

Recapitulation of seasons.

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* The Thermometer will rise to 130 in the shade out of doors.

† We have sometimes a cessation of the fall of rain, when the drying up process becomes active over the immense surface covered by water; bad fevers, dysentery, and even cholera, may then prevail.

‡ When, as Mr. Martin quotes "the earth is iron, and the air is brass."

regard to inundation* has also much influence on health, and in this respect seasons differ very considerably. Lastly, after the rains have ceased† there is the season of drying up, a clear sky with calm weather, an intensely hot sun, colder nights with heavy dews and extensive evaporation‡ from waters more or less stagnant and impure from the presence of decaying animal and vegetable substances. I have already alluded to the difference which exists in some respects between the climates of the three great divisions of country, Bengal Proper, Behar, and the North West Provinces. Bengal is not so cold at any season by some degrees, but the atmosphere is much moister, more land is inundated, and by reason of the influence of sea breezes a damper soil and atmosphere, and more vegetation; neither is the heat so intense or parching as in the Upper Provinces. Behar, as might be expected, has a middle character between the two—less damp, less rain, and less inundation than Bengal, and less parching heat and dry cold than the North West.

Effects of seasons.

### EFFECT OF THE DIFFERENT SEASONS ON THE HUMAN CONSTITUTION.

Of cold season.

In Calcutta.

We may judge from what authors writing in Calcutta state, that the cold weather there is not attended with results so beneficial to health as I have already mentioned to be the case in Behar and the Upper Provinces. Mr. Twining observes that during the cold season bad fevers prevail; and Mr. Martin speaks of the danger of exposure, the uncomfortable feelings of dry skin and inward oppression, and of the prevalence of apoplectic siezures.§ The mean maximum of temperature for these four months is 77 in the shade at 3 P. M., the mean minimum $63\frac{1}{2}$ at 6 A. M. At Goruckpore I find the mean minimum at sunrise to be 48 for the same four months, and the mean maximum 68 at noon. At this station the mean average at sunrise is 64 in the centre room of the Foot Artillery hospital, and at noon 69. As it is not heat alone that proves unhealthy, so neither is it mere cold that is essential to good climate. The fogs which prevail in Calcutta, and the exhalations from the salt water lake* and the large tract of the Sunderbund, are no doubt the sources of insalubrity partly, independent of mere temperature; over the whole of Bengal indeed the same causes operate more or less. In the parts of Behar I am acquainted with, and I know most of it by personal knowledge or the account of others, and in the North West Provinces, with the same qualification, I believe that no endemic of any consequence, nor any epidemic disease, can be said often to exist during the four cold months.† Exposure is safe if the head be well covered. The atmosphere is pure and bracing, and most people improve in health and appearance; they are more in the open air, and the doors and windows of houses are kept open. The improvement in health and appearance is more especially remarkable with the young and robust, and particularly with children. There is in fact an approach as it were to or a renewal of the European constitution, a better appetite, more inclination to take exercise, a feeling of strength and buoyancy, an improvement in the complexion, the consequence of the lungs receiving more and better food on which to perform their own process on the blood, and this again passing into all the organs and tissues and improving their condi-

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* The surface covered by the overflow of the Ganges and its innumerable tributaries is immense.

† The fall of rain during a year may be stated,—amount of rain at Bengal 70 inches, Behar 55 to 60, N. W. 30 inches.

‡ The evaporation from trees and other vegetables must not be omitted. In the N. W. the season of drying up is much shorter, there being much less land covered with water in proportion to the general surface.

§ And has proved that the greatest mortality actually prevails in the cold months.

Effects in Behar and Upper Provinces.

Effects of hot season.

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* Fogs and exhalations prevail over Bengal generally, and to a certain extent in Behar also.

† So much of the effect of moisture in modifying the operation of heat, and although dryness increases the degree of heat and increases some of it upon the bodies of men, yet by binding up of the surface of the earth, by diminishing the exhalations and by diffusing them, it prevents the generation and application of the noxious effluvia.—*Thomson's Cullen.*

tion. Of the effects of dry heat at the high standard which prevails in the months of April, May and June we have next to make mention. Sir Jas. Macgregor remarks that "during the march of the army over the sandy desert of Thebes, where the thermometer frequently stood at 118 in the soldiers' tents, the health of the troops was equal to what it had been at any former period in India.'* "Heat of itself, then," says he, "does not appear to be the principal cause of the prevailing diseases. It certainly is not, adds Dr. Johnson from whose work on tropical climates I make this extract, but when excessive and long continued it induces that state of the vessels on the surface and of the liver which is easily thrown into disease by the sudden application of slight degrees of cold."† That the skin and liver have their action increased by heat is quite true, but whether the sympathy exists‡ between the two functions on which the late Doctor so ingeniously erected his theory of many Indian diseases, is another question. It was observed long before his time that biliary derangements prevail most when the temperature is high, at which time too the function of the skin is usually increased. I have not yet seen a full and satisfactory explanation of the fact that the heat of an animal is in part independent of surrounding media, that in extreme cold the animal heat does not fall below 98, nor in a high temperature rise much above it. According to Liebig and O'Shaughnessy the animal heat remains the same in all climates, (see the former's work on Animal Chemistry) page 19, 2nd edition, and O'Shaughnessy's Manual of Chemistry; but Drs. Edwardes and Davy say the animal heat rises by a degree or two. From Liebig's work I quote the following passage: "the animal "body is a heated mass which bears the same relation to sur-"rounding objects as any other heated mass. It receives heat "when the surrounding objects are hotter; it loses heat when "they are colder than itself. This proposition, if true to the "full extent, we should have animal heat varying till it came "to an equality with the surrounding media. But we may "put a man in a stove, where the thermometer rises to 260, "yet his animal heat is the same as at the north pole, with "the thermometer at 30 below Zero." If it were a sufficient explanation of surrounding heat not raising the heat of an animal, that much is given off in the process of evaporation, we would yet require to know how the extra heat is produced that keeps the animal's temperature up to 98 while exposed to extreme cold; and the mere constriction of the extreme vessels and the consequent diminished evaporation does not I think explain it.

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* The mean heat of Calcutta given by Mr Martin,—
April 85, May 85, June 83.
Cawnpore, Ditto 82¼, Do. 90.
The latter taken from observations taken at sunrise, noon, and sunset, in the Foot Artillery hospital.

† If to the above we add the well known fact that the highest rates of temperature seem harmless at sea, it would appear that besides the mere heat of the air, other causes are in operation. The changes are more sudden on land than at sea.

‡ Determination of the fluids generally and of the blood to the surface of the body, it swells the flesh and produces that general chubbiness of appearance which is so remarkable in the torrid zone.—*Martin on the topography of Calcutta.*

"The temperature of the air has a most powerful influence on the action of the skin. Edwardes estimates that at 68 it is twice as much, and at 104 seven times as much as at 32."—*Ancell's Lectures.* We may estimate the discharge from the skin at least at 5 lb. in 24 hours.

It is stated by the same very eminent chemist that "the mu-"tual action between the elements of the food and the oxygen "of the air conveyed by the circulation of the blood to every "part of the body is the source of animal heat." And in another place, "the capacity of the chest in an animal is a constant quantity; at every inspiration a quantity of air enters, the volume of which may be considered uniform, but its weight, and consequently that of the oxygen it contains, is not constant; air is expanded by heat and contracted by cold, and therefore equal volumes of hot and cold air contain unequal weights of oxygen." It would appear then that in hot air there is actually less animal heat produced than in cold, because less oxygen is taken into the lungs. But to leave off these intricacies of an obscure part of the very obscure science of animal chemistry, in which I make no pretensions to knowledge, certainly the appearance of the European tropical resident seems to shew that he is not so well nourished as the resident of colder climates.* This I think must in part be attributed to defective in-door ventilation, where so much of our time is passed, and in part to the great deficiency of light in the dwellings of Europeans in India.† I have observed that those of our countrymen who live much in the open air, in spite of the greatly increased heat acquire a much more healthy appearance, and in fact look like residents of Europe itself: of course the head must be protected well, for the local action of the sun upon the head is most injurious, and a great source of sickness, causing fevers with head determinations, coup de soleil, insensibility, with convulsions or solar apoplexy, all which diseases will be noticed in their proper places. The increased nervous sensibility of the skin under increased action must not be left unnoticed, for on this indeed it would appear that much of the disease to which Europeans are subject depends; heat and cold act according to their sudden alternations, not merely according to their amounts. It is established that the effect of the deprivation of heat depends partly on the sensation excited.

Effects of rainy season.

In the rainy season the standard heat is but a few degrees reduced, while the sudden storms of wind and rain at times lower the temperature suddenly and considerably—at first the change is delightful and salutary, but the atmosphere is soon greatly saturated with moisture,‡ so that instead of the secretion of the skin being carried off by insensible perspiration profuse sweating takes place. The air carried into the lungs being so saturated, less oxygen is of course inhaled in any given time, and we must conclude that the pulmonary exhalation which in ordinary circumstances is one pound in 24 hours, will also be diminished. Added to this there is often an utter stagnation of the atmosphere, which renders breathing oppressed and laborious, and the discharge from the skin very profuse.* This discharge being in the form of sweat, it renders the body very susceptible to the influence of blasts of wind, by reason of the sudden cold which is produced by evaporation.† Fevers and dysentery are thus occasioned, both being occasionally epidemic in the rains, and at this time their type is usually more congestive than inflammatory. A prolonged period of stormy weather with rain will often be followed by catarrhal epidemic fever; a clear sky with calm weather and hot days and nights will bring dysentery and fever of a congestive type.‡

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* In fact this is admitted in another part of the work and used as an argument for a lower diet in hot than in cold countries, as there will be less oxygen to consume the carbon. We may presume that all this is managed for us better than we can do it for ourselves.

† The complexion is pale and the looks languid, muscular power is weakened and all bodily energy is diminished. How few of long residence even with the most temperate habits who have not their nerves shattered.

‡ Although medical authorities have not been able accurately

Effects of drying up season.

In the drying up months the alternations of temperature become greater. The hot sun and clear sky give full intensity to the generation of miasm§ and the sudden fall of temperature

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to estimate the effects of moisture either acting simply or in combination with heat, yet it is certain that this last is more injurious than either applied separately.—*Martin's topography of Calcutta.*

* I am not aware of any experiment to shew the extreme amount of the cutaneous discharge in this climate. The diminished secretion of urine is one manifest effect. Magendie gives 6¼ pounds in 24 hours as the amount of pulmonary and cutaneous transpiration, and the cutaneous is to the pulmonary as 8 to 5.

† Dr. Twining has noticed a pale and unhealthy white color of the skin as the effect of a humid atmosphere with heat long endured.

‡ Suppose the atmosphere so hot as to equal the temperature of the human body, and at the same time saturated with moisture, sweat is then excited to such a degree as to bathe the surface—transpiration is suppressed.

§ Heat is the chief cause of the production of miasmata, but a degree of moisture is necessary for their accumulation. and the moisture also contributes in applying them to the bodies of men.—*Thomson's edition of Cullen.*

makes the body more liable to the impression. Fevers will have more of a remittent or intermittent type, and if the rains break up early and the locality be favourable to the production of malaria we shall have a severe bilious remittent, sometimes approaching in character to what we read of the yellow fever of the West Indies and South America.*

Of the effects of the different seasons in producing particular diseases we shall have to treat more at length presently, but it may now be said that in Bengal the effects of damp, heat, and inundation, give there a character to disease ; fevers prevail oftener which depend upon malaria, and have the type of periodicity with congestions, collapse and visceral engorgements, chiefly abdominal. In the North West again, disease has more of an ardent type, higher vascular action, more head affections, and less inclination to periodicity, especially in the hot months, while the exanthemata, measles, and variola, and sometimes scarlatina are more rife and severe.

Effect of seasons on natives.

We may notice briefly the effect of the seasons on the natives of the country. The dense population proves that the climate has no character inimical to life. The moist plains of Bengal and the arid in comparison the almost deserts of the North West teem with population. The Bengalee race are very peculiar in form and feature, and in the approach almost to the woolly hair of the Negro: the climate of that part of the country indeed approaches to that inhabited by the great Negro family of the human race. Among the up country inhabitants we see noble specimens of human organization ; but the general law of early maturity and corresponding decay being characteristic of the organization of hot countries holds good.

Bengalee race.

Hindoostanees.

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* After the breaking up of the rains the atmosphere is usually remarkably still—not a breath of wind blowing from any quarter. The sense of heat is then very oppressive. Dr. Jas. Ranken writes "actual experiment has convinced me that a still atmosphere at 78 is less tolerable than light airs at 96." This is not always because the moving air is itself cooler, but because it does cool by evaporation, the effect of its contact with the discharge from the skin.

Effects of habit and exposure.

By habit and constant exposure, and by hereditary physical structure, the natives' power of enduring heat, even from the direct rays of the sun, is far beyond that of the European. He goes his journeys, and tills his fields, exposed to the full solar influence, often with his head uncovered. The thickness of the integument covering the skull and the color of the skin are said to give him part of this immunity. These are portions of the general organization, which climate modifies till it accomodates the human frame to the necessities it has to bear. This is theoretical and opposed to our limited observation on the children of European parents ; but how else can we explain that this country is thickly peopled by the same species of a race, another variety of which cannot be reared for three successive generations ? I copy the following from Alison's outlines of human physiology : " the secretion on the cutis vera which gives the black color to the skin, appears to assist in fitting men for residence in hot climates, because although such skin by absorbing more caloric, rises to a higher temperature under the sun's rays than white skin does, yet it does not inflame so readily from a rise of temperature ; and as the radiation of caloric from it when its temperature is higher than that of surrounding objects, is greater than that from the white skin, those who have it must enjoy greater alternations of heat and cold."

Thickness and color of the skin.

Constant exposure deadens its sensibility to impressions.

The constant exposure of the skin by many natives to the impression of heat, and that often combined with moisture, deadens its sensibility as we see familiarly illustrated by the manner in which they handle fire ; and on the principle noticed already changes of temperature are less felt. This is probably the reason why they suffer so little from acute liver affections, and also from the diarrhœa depending upon disordered function in the liver, so common among Europeans, at the setting in of the hot weather. In short the climate is suited to them, and they are suited to the climate, so that their diseases depend more upon local and conventional causes, than upon those

The reason of their exemption from same diseases.

But they have no immunity from fevers.

Remarks on the susceptibility to fever of different races.

which may be called climatic. Many writers have mentioned the comparative immunity of the natives of a country from the local influence of malaria. I may mention here the fact stated by Dr. Fergusson, that it is only newly arrived Europeans who are liable to yellow fever in the West Indies.* If my memory serves me correctly, the remark will not apply to the yellow fever of the continents of America, or to that of Spain and our own great fortress of Gibraltar.

Facts from the Niger expedition.

Dr. Macwilliam again in his account of the disastrous expedition up the Niger, states, that out of one hundred and fifty eight blacks only eleven were attacked with fever, and none died; and out of one hundred and forty-five Europeans there were one hundred and thirty cases of fever, and forty deaths. The subject is curious and worthy of further enquiry; certainly some races appear much less subject to fever than others. My friend, Dr. Campbell, the present Superintendent of Darjeeling, in his interesting notices of the hill tribes, mentions one that lives with perfect security in forests that at some seasons it would be certain death for any other person to visit. The Dangurs, or natives of the Chota Nagpore Hills, appear to enjoy an equal immunity. Both are consumers of animal food, and are of the Mongolian variety of the human family. The natives of Hindostan have no such protection: at all seasons of the year they suffer from fever in their own climate, and the tables of Dr. Finch, quoted in my first chapter, as well as the records of our armies that invaded Ava, Arracan and China, will shew that in foreign climates they have no sort of immunity.

Dr Campbell's statement regarding a hill tribe.

Dangurs of Chota Nagpore.

Effect of cold upon the natives

The low state of the sensibility of the skin appears to act in the native's favor, in guarding against the effect of cold; for if we consider the thin clothing of those who are well off, and the almost naked state of the lower classes, they do not suffer much from the effects of low temperature. Common catarrh and ordinary bronchitis of course prevail during the cold season, but we might expect them to be more prevalent and severe. Tubercular disease seems much more prevalent in the Upper Provinces; how far this depends upon mere temperature, and how far upon other causes, is a question which the history of the disease in all countries, even after the great research bestowed upon it, leaves yet undecided.

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* But it is fair to mention in Dr. Fergusson's own words that he draws a distinction between the causes of yellow fever and common remittent. "Most certainly," says he, "yellow fever has often prevailed on the finest soils and in situations where the agency of marshes could not possibly exist." But in other places he says the same of common remittent.

## EPIDEMICS.

General remarks upon epidemics.

On the subject of climate there is no question more interesting than that of epidemics.

Those to be considered which appear in this climate.

I have remarked in a foregoing page that great periods of sickness are usually preceded by unusual states of the weather, and I intend to illustrate this truth by further observations. It is a truth indeed acknowledged in all countries, but my object is to make practical application of it to this climate.

Epidemic cholera.

Reports upon.

Deductions to be drawn from them.

In the reports on cholera of the three Medical Boards, published after the great epidemic which commenced in 1817, lengthened details of the state of the weather antecedent to and during the outbreaks of cholera will be found. If we hold the opinion that the outbreak or particular violence of this disease depends upon one specific state of weather, nothing can be more contradictory than these reports; but I believe a careful perusal of them will warrant the general conclusion, that it is when the climate of a particular season departs from what we may call its normal condition, that we may expect cholera and excessive degrees of other sickness.

Report of Mr. Jamieson.

Mr. Jamieson gives a minute and curious detail of the weather which prevailed during the whole of 1815, 1816, and the months of 1817 which preceded and accompanied the cholera. The departure from the usual state of things was very remarkable and extensive, such as we might expect would have an extended and long continued effect on animated nature.

We shall observe that it was not from cholera alone that the population suffered, and I may here remark that as the seasons of this climate are usually marked by great regularity, so we are better able to trace deviations and to connect them with sanatory conditions.

The subject being interesting and highly important with reference to this chapter, I must quote at some length from the report of Mr. Jamieson.

In the introduction to the report Mr. Jamieson gives an excellent and graphic description of the climate that usually prevails in Calcutta, and it is by contrasting this with what occurred before and during the epidemic, that we can fully understand the difference.

1st extract from Mr. Jamieson's report on cholera.

"In Bengal and in the Central and Northern Provinces of "Hindostan, the seasons obedient to the course of the sun generally succeed each other with an undeviating regularity, "quite unknown in the variable climates of the old world. "Taking their names from the quality which peculiarly characterizes their march, they have by common acceptation "been divided into the cold, the hot, and the rainy seasons. "The cold season commences with November and ends in "February. About the middle of October the weather begins "perceptibly to change—the days are still oppressively hot, "but the mornings and evenings become cool; the wind, "which during the preceding months had blown generally from "the south and east, now begins to come round to the west "and north, and to carry with it the heavy masses of clouds "which almost constantly float about, and obscure the horizon "during the whole of the rains. The atmosphere, from being "very damp and watery, grows dry and elastic, and the heavens "to brighten a little; but these appearances are not yet uni"form, the sky still at times becomes gloomy and overcast, "and heavy showers accompanied by thunder and lightening "shew that the south east monsoon has not yet finally taken "its leave.

" In November, the weather becomes delightfully fair and " pleasant, a cold sharp wind now blows steadily from the " north, the air is dry, clear, pure and serene, the vault of heaven " is of a beautiful deep blue azure colour, and in general not a " cloud is to be seen ; the nights are clear with heavy dews, " the thermometer in the shade ranges throughout the month " from 66 to 86, the mean heat about 74, medium altitude of " the barometer 29.98.

" As December comes on a considerable change takes place. " Although the middle of the day and the afternoon be clear and " fine, a haze generally towards evening collects around the " horizon and obscures the setting sun ; as the night advances, " thick fogs, sometimes general sometimes partial, begin to collect, and do not disperse until morning. As they are broken " up by the influence of the sun's rays, their vapours rise and " form grey masses of clouds which render the early part of " the day so hot and unpleasant, and do not disappear until it " is far advanced. These fogs do not by any means occur " every night—sometimes, though rarely, the whole month passes " over without them ; ordinarily they appear only three or four " times, sometimes during several nights successively. As in " November, the north and west are the prevailing winds—they " are very sharp, but blow steadily, never rising to a gale, nor " falling to a perfect lull ; the range of the thermometer is from " 56 to 78, the mean temperature about 70, altitude of barometer 30.10.

" During January much the same weather prevails ; the " air is serene and piercingly cold, the wind blows steadily, and " perhaps more forcibly from the north and north west than " in December. Fogs are still very frequent, and sometimes " so thick that scarcely any object is visible until a late hour " of the morning, and every thing exposed to the external air " becomes wet and covered with drops of moisture ; they " may often be seen rolling in large dense bodies in opposite

" directions. During the clear nights heavy dews fall—the range " of the thermometer is from 47 to 75, the mean heat about " 68, altitude of the barometer 29.99.

" May is the most disagreeable month in the year—in the " commencement there is high wind at times, but during the " greatest part of the month the weather is exceedingly close, " still and oppressive. The nights especially are sultry—there " is little or no wind in the mornings, which are thick and " hazy, with low, gloomy scattered masses of clouds; but as the " sun rises a breeze springs up from the south, and keeps gradually freshening until the evening, when it again fades away. " The air is hot but inelastic, and as it does not carry off the " perspiration leaves the body moist and clammy. The dejection and lassitude now universally produced by the great " heats are, however, fortunately removed by the frequent recurrence of north westers with their usual accompaniments of " thunder and rain. There are no fogs during April or May— " the thermometer ranges from 81 and 93, mean heat 86, barometrical altitude 29 or 60.

Extract continued.

" In some years, but not always, nor even generally before " the 15th and 25th of the month, the horizon becomes overshadowed with dark thick clouds from the south east quarter, " and much rain falls during several days, constituting what are " called the lesser rains; but more commonly the close muggy ' weather continues with little interruption until the end of " the first or the beginning of the second week of June, when " the veering round of the wind towards the east, the occurrence " of thunder in the evening, and the cloudy state of the atmosphere, indicate the approach of the regular rains. These " commence from the 4th to the 18th of June, and continue " with frequent variations during the four following months. " At first they set in with thunder showers, sometimes heavy, " sometimes light, generally from the south and east; then " follow several days of very heavy rain, during which the sun " is completely hid from view; then there is a shew of fair

" weather with sunshine and beautiful clear nights, but this is " of very uncertain duration, and liable to be interrupted with " scarcely any previous warning. The heavy rain rarely keeps " up for more than 48 hours at a time, then gradually dimi- " nishing to drizzling, and at length gives way to fair weather. " There is at frequent intervals during the whole period of " their continuance much vivid lightening with violent thunder- " storms and strong gusts of wind. The wind frequently " changes from east to south and west, rarely to north ; its re- " turn to the east, and fixing steadily in that quarter, is usually " accommpanied with heavy rain.

" As soon as the rainy season has fairly commenced, " the atmosphere becomes evidently cooler, and the weather " in general very pleasant ; the only exceptions being now " and then a sultry night, and the dead oppressive calm " which sometimes precedes a storm. From the dust and " other particles floating about in the atmosphere being " carried away by the successive showers, the sky during the " interval becomes beautifully clear, the sun shines with great " splendour, and the nights are bright with innumerable stars. " There is very little variation of the atmospherical temper- " ature throughout the season. The thermometer ranges from " 77 to 88 or 90, the mean heat being 81 or perhaps a degree " or two higher, the air from the constant rain becomes sur- " charged with moisture, and every thing exposed to it gets " damp and mouldy. There is consequently little alteration " in the barometer, the mean altitude is about 29.45—it is " higher at night than in the morning, and lowest at midday.

" In September the barometer is observed to rise a little, " but there is little perceptible change in the weather, 'till the " middle of October. The rain then begins to abate ; the show- " ers are fewer in number, and, though heavy, of short duration ; " the wind gets very variable. There are still frequent shews " of thunder and lightening, but they generally pass off with- " out producing rain. The days are yet sultry, but the mornings

" and evenings begin to get cool, and the increasing clearness " and elasticity of the air with the coming on of dews at night, " presage the speedy accession of the cold season.

" At length the veering round of the wind to the west, " north west quarter, the disappearance of clouds and vapours " from the horizon, the sharpness and dryness of the air, the " rapid rise of the barometer and concomitant fall of the thermometer towards the end of the month, evince the entire departure of the rains. The total quantity of rain falling during " the season varies much in different years. In Bengal the " average has been fixed at 70 inches.

" The effect produced upon the face of nature by the " change from the destructive heats of April and May to the " refreshing days of June is immediate and striking. Do.

" The whole of the vegetable kingdom, which had drooped " during the previous long drought, is brought into speedy and " active life, and the ground from being parched and bare is " soon covered with a luxuriant carpet of green. The animal " kingdom shares in the favorable revolution, and all space " is filled with myriads of insects just called into existence. " The rivers, wells and tanks are speedily filled to their margins. In the lower parts of Bengal the face of the country " is soon covered with water, often to such depth that a passage may now be made in boats between places which during " the cold and hot season lay high and dry.

" It will be observed that the foregoing notices are more " applicable to Bengal and the lower provinces than to the " central and upper parts of India. In the latter the seasons " are considerably modified: the cold weather begins earlier and " lasts longer, and is far more dry, sharp and invigorating—it is " very rarely accompanied by fogs. Throughout the hot " months the wind during the day and earlier part of the night " blows strongly from the west, and is so dry and fiery that it " parches up the whole country, the rains set in late, and " though sometimes vehement while they last, are of shorter " duration."

2nd extract from Mr. Jamieson's report.

" The changes which have taken place in the course and " succession of the seasons within the last few years in every " part of Bengal and its dependencies, have been so striking " as to have not merely attracted the notice of attentive observers " but to have become a frequent topic of common conversation. " In noticing the nature of these deviations, it will be neces- " sary to begin pretty far back.

1815.

Rains. Cold season.

" In the year 1815 a rainy season marked by an excessive " fall of rain, great inundations and the bursting of the Ganges, " Soane and Koosi rivers from their beds, was succeeded by a " damp unpleasant cold weather, with unusually frequent dense " fogs in December and January.

1816. Hot weather.

" The following hot weather was remarkable for the late " and scanty appearance of the usual thunder storms, and con- " sequent great heats and drought.

" Although several North Westers occurred during April " and May, they were very partial in extent, and generally un- " accompanied with rain. On the 15th April 1816, a little be- " fore mid-day, a shock of an earthquake was felt in Calcutta. " Towards the end of May the weather had become so oppres- " sive, that the thermometer sometimes rose as high as 98, an " unusual height in Bengal, and many individuals, both Euro- " pean and natives, dropped down dead in the streets—much the " same kind of weather was experienced in the Upper Provin- " ces. A severe cold season followed by excessive drought " gave rise to great sickness amongst the natives, and by des- " troying the spring (rubbee) crop of grain prepared for the " succeeding general scarcity.

" In the lower provinces the dreadful sultry weather con- " tinued until the 14th of June, when the rains commenced. " They kept up moderately in Calcutta and its vicinity, during " the latter part of June and the whole of July. A second shock " of an earthquake was on the night of the 17th July felt " slightly at the Presidency, and more perceptibly at Moorshe- " dabad. Towards the early part of August and the beginning of

" September the rain became exceedingly scanty, and the days " and nights oppressively hot in Calcutta, and in the western " parts of the province of Bengal the drought was so uncommon as to dry up the rivers, and give rise to apprehensions " for the safety of the rice crops.

" Then about the end of the first week of September this " unwonted drought gave way, and was succeeded by very heavy " rain, which lasted all the month, and caused a greater and " more general inundation than had occurred within the recollection of the oldest inhabitants.

" In the Upper Provinces the extraordinary scantiness of " the rains was yet more remarkable, and was attended with " more formidable results. In the month of July a few showers fell, but they were partial and of short continuance. " More generally from Benares upwards, Oude, the districts " within the Dooab and those west of the Jumna, were dried " up by the long continued and increasing heats. The parching west wind kept blowing throughout August and the first " fortnight of September—not a shower fell—and so scorching " was the heat, that tatties were in use at Futtehghur, Coel and " other stations during the whole of this period. Since 1803, the " memorable year of the commencement of Lord Lake's campaigns, no such season had been experienced.

" As in Calcutta, and about the same time, this long period " of drought was succeeded by heavy and incessant rains for " many days, and the whole country was laid under water.

" The ensuing cold season, both in the Upper and Lower " Provinces, was raw, damp and unpleasant, and throughout " cloudy, with frequent falls of rain.

" In Calcutta November was marked by unusually frequent " fogs, succeeded by warm days, and light variable winds.

" During the month there were nine foggy mornings; " two days were cloudy, the remainder clear—the thermometer generally ranging between 70 and 77 at 10 a. m.

"In December the same kind of weather prevailed. "There occurred sixteen foggy nights, on two occasions fine "nights in succession; the days were still, warm and clear, "with moderate breezes from the north and west—range of the "thermometer from 66 to 71.

"The early and middle parts of January were cool and pleasant, with fewer fogs than in the former months; the prevailing wind was northerly, with more clear than cloudy days, and "the thermometer stood much as in December. On the 28th "light winds, chiefly from the south, with very thick fogs and "sultry days, supervened, and so continued the rest of the "month.

"The singular deviations from the ordinary course of the "seasons which marked the remaining part of the year now "began, and February had much more the appearance of an "autumnal than of a cold weather month, for it commenced "raining heavily on the night of the 1st, and so continued "every third or fourth day 'till the end of the month. A reference to the annexed table will shew that it rained excessively on the 1st, 2nd, 4th, 11th, 18th, 20th, 21st, and 22nd.

February.

"The remainder of the month was cloudy, with high wind "from the north and east; there were hot foggy mornings, "the thermometer fluctuating from 67 to 78.

March.

"March differed from the preceding month only in the "frequency of thunder storms during nearly its whole course. "Much and very heavy rain still continued to fall, and there "was a constant alternation of cloudy and clear weather, with "winds varying greatly in strength, and latterly almost always "from the south. On the 21st there was an exceedingly "violent thunder and hail storm followed by torrents of rain, "which greatly injured the spring grain crop, and the new "sown indigo lands, and destroyed the blossom of the mango "and all other fruit trees then in bloom; the air though cool "was raw and unpleasant; thermometer from 68 to 82.

"There was nothing remarkable in the diseases of this period,—Europeans and natives were now generally uncommonly healthy; among the former chronic rheumatism was the prevailing complaint. On the 30th, however, an European soldier belonging to His Majesty's 59th Regiment, then in garrison at Fort William, was attacked by cholera morbus, and, in spite of every remedy, died in thirty-six hours.

April.

"April was generally cloudy, with strong southerly winds and frequent thunder storms and north westers, in this resembling the regular appearance of the seasons more than any preceding months.

"On the 18th there was a heavy fall of rain, and from that time to the end of the month the air was dry and mostly clear; the weather was uncommonly cool 'till the 27th, the thermometer not having once risen higher than 85. On the 27th the heat was 91, and it kept up to nearly the same point during the three following days; a few cases of fever occurred, especially amongst new comers, about the middle of the month, but generally there was yet very little disease in the settlement.

May.

"The first week of May was hot, sometimes with little wind. On the 3rd there was a strong gale, with rain from the east; on the 5th a north wester, and on the 6th more rain. During the two following weeks nothing extraordinary occurred, the southerly winds kept blowing moderately, with frequent showers; on the 17th there was a strong gale, with rain from the south east, followed by cloudy weather, which brought up a severe north wester in the evening of the 24th. Up to this period the air was cooler than usual to the feel, although the thermometer generally stood at 82 at sun rise, and 90 at 3 P. M. On the 25th of this month, at least fifteen or twenty days earlier than ordinary, the rains set in, and there was almost constant rain, with variable winds, close weather, and heavy clouds 'till its close. As yet there was

" no interruption to the previous healthiness of the city—slight " fevers and bowel complaints filled up the sick list, and " hardly an instance of hepatitis came under notice.

June. " From the 4th of June to the close of the month there " was scarcely a fair day—an immense quantity of rain fell, and " before the end of the month the river was quite full, and the " country nearly under water; the sky was almost constantly " cloudy; the atmosphere generally cool and pleasant, at times " close and sultry; thermometrical range from 80 to 87, medi- " um of heat 83.33, winds variable, generally moderate; the " prevailing diseases, although still of unusually limited extent, " now became more severe, requiring more active treatment " than before—to fever, hepatitis and flux, acute rheumatism " was now added, and proved rather troublesome.

August. " From the 1st to 10th of August excessively heavy and " almost incessant rain continued to fall—on the 8th, 9th, 10th " and 11th it poured in torrents and without interruption. " The weather was generally cloudy and calm with south easterly " winds, temperature rarely higher than 85, often as low as " 81; the middle of the month was hot and oppressive, and " the nights sultry and exceedingly disagreeable; the thermo- " meter then fluctuated between 81 and 87 and there was little " wind, generally south west. From the 22nd it rained every " day, but, except on the 31st, not very heavily, 'till the close of " the month, with variable winds mostly from the south and " east. Amongst Europeans the only complaints yet noticed " were slight fevers, severe cases of dysentery, and hepatitis; " but the natives now for the first time began to suffer severely " from the epidemic cholera.

September. " In the early part of September the weather continued " close, sultry and unsettled, with frequent showers; but pre- " viously to the 7th the water in the tanks had fallen near- " ly a foot, a clear proof that the general body of rain given out " by the clouds was now beginning to diminish. There was

" much rain, with variable winds throughout the remainder of " the month. From the 16th, although the days kept hot, the " mornings began to get pleasant, and the atmosphere at times " to be free from clouds, so that in the middle and latter part " there were several clear days with bright sun, and consequent " great evaporation. The mortality had now become exceedingly " great amongst the Natives, and was no doubt increased by " this, amongst other causes. On the 28th there was a fog. " At this period there was no remarkable variation in the atmospherical heat; the thermometer ranged from 82 to 89; at " sunrise it generally stood at 84. The usual endemical diseases, " fever, flux and hepatitis, were this month rather common—the " fevers were rather slight, seldom needing the lancet; the " dysenteries were, as is usual in hot climates, mostly connected " with inflammation in the liver, and sometimes terminated in " abscess of that viscus, and consequent death. Upon the whole " it was observed that in Calcutta, from the commencement of " the preceding hot season until the end of August, there " was less sickness, especially amongst Europeans, and that the " symptoms of the disorders principally attacking them were " milder than during similar periods of many preceding years. " Was this ascribable to the low temperature then generally " prevalent and to the humid and cloudy state of the atmostphere " proving congenial to the European constitution, from its " approximation to the cold and raw climate of European " countries?

" Several cases of cholera occurred amongst Europeans, on " the 5th of September, and from that day forward the disease " became daily more frequent. Why it reached them at this " peculiar moment cannot be discovered from the most accurate scrutiny of the meteorological observations for that period. From these it appears that the first three days of the " month were cloudy, with showers and moderate breezes " from the south east, and that from the 4th to the 14th the " weather was constantly rainy with fresh gales from the same

" quarter ; and the fluctuations of the barometer and thermometer were during the whole time so small, as scarcely to " deserve being noted down."

In the preceding detail if there is any thing deducible beyond the unnatural irregularity of the seasons causing insalubrity, it must surely be the fact that epidemic cholera commenced in Calcutta in September 1817, after a very unusual fall of rain. If from this we draw the inference that unusual quantities of rain produce cholera in its epidemic form, we are immediately met by numerous records of its worst invasions occurring during dry sultry heat.* " We find," says the editor of the Lancet, " that it swept the surface of the Arabian deserts where showers never fall, and where a spring of water is the object of a journey of a hundred leagues." I may also instance the late awful outbreak at Kurrachee, and I have myself often seen the disease very destructive during periods of great drought. It was in November 1817, when no rain had fallen for some time before, that the grand army of the Marquis of Hastings was attacked. Of the season we have the following account by Mr. Jamieson : " in the middle provinces there was " nothing very peculiar in the progress of the rains, but in the " districts of Cawnpore and of Bundlekund, and generally " throughout Upper India, the rains were observed to be re" markably scanty"—the reader need scarcely be reminded that it was in Bundlekund the grand army was attacked. The following is an account of the weather as it prevailed at the time : " of October the first 8 days had been cloudy, with easterly wind and occasional falls of rain, the thermometer ranging from 79 to 90 ; from the 8th to the end of the month with little variation the wind was strong from the west and hot with clear sky and sultry weather, the mercury towards the latter part falling as low as 62 at sunrise and keeping as high as 98 and

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* " At Patna the weather had been very hot and dry some time before its appearance."

" At Futtygurh the weather had been insufferably hot, and not a drop of rain had fallen for a month."—*Corbyn on Cholera.*

99 at noon, and from 84 to 86 at sunset. The same extraordinary fluctuations in the range of the thermometer were remarked during the early and middle parts of November; the mercury from the 1st to the 17th standing from 50 to 69 at 6 a. m., from 84 to 99 at noon, and from 63 to 90 at 6 p. m, the wind still keeping westerly."

"About the 5th the effects of the sudden transitions began to be more marked than before: the days became insupportably oppressive, and the nights extremely chilly, with heavy dews and fogs in the morning. From the 6th to the 12th, the period within which it is agreed by all that the camp was affected by the epidemic, the thermometer was never higher than 51 at sunrise, nor lower than 84 at noon. On the 6th it was 50 and 90, and on the 7th 45 and 90. These it will be remembered were the days during which the earliest cases in all probability occurred. About the middle of the month the difference of temperature between the day and night became less, and the disease sensibly declined from the 17th, and wholly withdrew towards the latter part of the month as the variations grew more equable."

The above was written in 1818. How little did the author dream that from that time to the present the disease would continue to maintain its ground as an endemic in the whole of British India, appearing occasionally in a severe epidemic form; and how much less did he conjecture that it would devastate European countries for a time, and then leave them altogether. Modern science with all its light has not shed a beam over the darkness that obscures the whole question of epidemics, and especially difficult is it to comprehend how a disease of such mortal power can arise where it either has never existed before, or at any rate not for centuries. Being endemic in a country there is less difficulty in comprehending that particular conditions of climate will enhance the intensity or may be we should say increase the production of the remote cause. But let me return to the record of my own observations, and proceed to trace in a general way what I have observed on the subject of cholera as an epidemic of this climate ; and here the question arises, when a disease endemic in a country or rather, as is the case with the one now under notice, making perennial visits ceases to hold its endemic character and becomes an epidemic. Her Majesty's 21st stationed at this place, while I am writing, had 7 men, and only 7 men attacked with cholera a few days ago, every man of whom died. The native Regiments and the European Artillery have escaped, and only one or two natives have died. Are we to call this an epidemic visitation, or is it the endemic yet, because it has only attacked a few ? It seems to me that here is a distinction without a difference, causing too some confusion ; for we are told by one writer that the epidemic cholera is to be distinguished from the sporadic (I suppose here signifying the same as endemic) by the blue color of the skin. I have seen a case of cholera preceded by or succeeded by no other for months get as blue as ink. This, however, is a digression. I have no records even of my own observation of cholera outbreaks ; but I think the following observations will be found to accord with the experience f others. When the heat of the season has become intense cholera may be expected. It is heard of first in each hot season in Bengal, next in Behar, and so on in a north west direction. It is most prevalent in years when the weather is unseasonable by frequent and cooling showers followed by intense heat, or by long continued ardent heat caused by the non-appearance of the rains at their usual time. In the rains again I have seen it when there has been a long interval without good soaking falls. A third period when I have occasionally but more rarely seen outbrkeaks is after the rains are over, and when the cool nights and heavy dews denote the approach of the cold season. At this station the hot season of 1845 was remarkable for repeated falls of rain during the latter part of March, and in April and May, Cholera raged very violently, especially for the few days before the regular rains set in. It then disappeared, and though the

Personal observations regarding cholera.

rains ceased unusually early, (in the end of August) we had no further visitation. It was then however that Meerut, Umballah, and even the hill stations of Subathoo and Kussowlee were so awfully scourged. During the hot months of 1846 and 1847 we had no rain at Cawnpore; both years have been much cooler and the weather more steady than in 1845; during these two years I do not think there was a case of cholera even among the natives, until the disease appeared a few days ago,* as already mentioned. At Dinapore again I repeatedly read of storms of rain last hot weather, and the 98th Foot cantoned there have suffered dreadfully from cholera. I could multiply instances to prove that the disease has appeared during intense dry heat and during intense cold, (it raged in Russia when the ground was covered with snow) during excessive draught, and when rain has recently fallen, while strong dry west winds are blowing with fury, when not a leaf stirs, or during a long continuance of damp easterly wind. If we can apply any general observation to this capricious epidemic in our climate, it would seem to be that the regular cold weather stops it, as do almost always the rains, and that its epidemic visitations are usually, if not indeed always, accompanied by states of the weather which may be called unnatural for the period of the year at which they occur. I am not aware of any observations as to the weight or electrical state of the atmosphere tending to elucidate the connexion of this awful disease with these particular conditions. In Europe Dr. Prout, after making experiments for a long time before, discovered an increase in the weight of the atmosphere the very day the disease appeared in London; but in Paris the experiments were quite unsatisfactory. Further investigations on this head are very desirable.

*Felix qui potuit rerum cognoscere causas.*

## EPIDEMIC FEVERS.

Epidemic fevers.

To record a minute and detailed history of Indian epidemic fevers would not perhaps be very profitable, even if it were possible. As the case stands, we have only occasional notices of particularly severe invasions, when such happened to fall under the observation of one accustomed to place the result of his experience on record. Some of these I shall have to notice as I proceed to note what I consider to be the usual connexion of epidemics with cognizable conditions. I know well, however, that at times it goes quite beyond our power to connect effects with causes here. The late Dr. Mellis well observed, "in our pursuit after knowledge it is little cheering at times to find that we are surrounded by immaterial and invisible agents, which elude our grasp and can never become the subject of analysis or demonstration: in so far therefore as certain conditions of atmosphere operate on our constitutions, on mind as well as on matter, we must ever be much in the dark, and not less so as regards the same imperceptible agency causing changes, as well in the course or march as in the character of epidemic diseases." The present state of our knowledge is accurately described in the above quotation, but I cannot subscribe to the opinion that we are destined to remain for ever ignorant on the the whole of the points mooted. As the specific contagions and miasm are absolute substances, why should we despair of being able to detect them by manipulation? And if we did detect them, we might then know or proceed to investigate with a better clue whether their occasional increased virulence be owing to increased production, or to particular states of the atmosphere as to heat, moisture, electricity, &c. and there seem to be other epidemics which, not having a specific exciting cause, must be held to depend upon atmospheric conditions, whether we can trace them or not—influenza for instance. If after these observations I venture to offer a familiar account of the epidemic fevers of this climate, and endeavour to connect them with cognizable conditions of soil and atmosphere, the reader will be pleased to recollect that I am aware of and admit the occasional presence of other obscure causes which, for want of a better name, have been collect-

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* Written in September 1847.

State of our knowledge on this subject.

Author's hope that some discovery will yet be made on the subject of the poisons which cause fever.

ed under the term of epidemic constitution of the atmosphere.*

Division of epidemic fevers.

The fevers of this climate may be epidemic in a continued remittent or intermittent form; and under a fourth head we may consider the epidemic character of the exanthemata as they appear in this country.

Continued fevers.

When the hot season sets in rapidly, and strong west winds blow throughout the night, suddenly and considerably lowering the temperature by their evaporating power, or when at the advent of the hot weather there are storms of wind and rain, I have seen continued fever marked by chest symptoms, pneumonic or pleuritic in the ill clad and exposed, bronchitic in those more favorably circumstanced.† In years where the hot season is unusually prolonged, that cause will occasion fevers, where the chest symptoms are no longer so prominent, the head is the organ then apt to become affected. The type of these fevers is ardent, in which most patients will bear free depletion. The period of their duration is not definite. A theorist might say of them that they were only influenza in an aggravated form. During boisterous weather in any part of the rainy season I have also seen continued fever prevail as an epidemic, but it is then, though still attended often with catarrhal symptoms, more of an asthenic character, requiring less active treatment, and occasionally manifesting an inclination to remissions. Pains in the back and limbs are generally present, with a tardy convalescence, though the disease is seldom fatal—abdominal complications will be met with in this fever.*

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* The two following familiar facts will impress one with the small amount of our information as to the manner in which various gaseous exhalations are infused in the atmosphere, and how they act upon the human organization. If a deer-stalker places himself even as far as ¼ of a mile to windward of the wary animals, they will immediately fly though they do not see him. We can scarcely imagine an instrument so perfect as to recognize the substance that undoubtedly acted upon the delicate organ of the animals. Again, let us consider that the merest drop of variolous matter will excite a high degree of commotion in the human body, and lead to the formation of immense quantities of a similar virus; and we need not be surprised that many substances float in the air only known by their effects.

† After writing the above, I have fallen upon a notice of this kind of epidemic as prevailing at Mhow, Meerut and Bareilly in April 1832. At Meerut in ten days it attacked 200 men of a Queen's Regiment.

Remittent fevers.

Remittent may prevail as an epidemic in the hot season, during the rains, or in the drying up months. When we have unusually heavy falls, in May or the end of April, followed by intense drying heat, remittent often becomes frequent and severe. In the rains, when there are long intervals of dry weather with much sunshine, it may again prevail, but after the breaking up of the rains is the period when the great remittent fever of Bengal, Behar and the Upper Provinces prevails extensively. As we see no year without it, it is undoubtedly endemic, but on the other hand there are some seasons when it is so prevalent as to the numbers attacked, and the localities visited, that we cannot help calling it an epidemic. Excessive rains in August and September may be considered as most likely to produce it intensely, for if we have rains later there will be less intensity of heat during the drying up process. In seasons of great inundation, when the heat is intense during the day, with a still calm atmosphere and heavy dews in comparatively cold nights, the epidemic will be wide spread over the country. In other years particular localities being inundated at an unfavorable time may have the disease in an aggravated form. The disease has also been known to prevail extensively in seasons of great drought, I may instance the fever which was so destructive in the N. W. Provinces in 1838 and 1839.

Occur at different seasons.

Causes producing them, intensely excessive rains.

Great droughts.

There may be two reasons for the prevalence of fever in seasons of unusual drought—1st, that the inhabitants suffer from starvation, which impairs the general state of health for a long subsequent period—2nd, that the heat is more intense, and dries up places that would not otherwise dry 'till the cold months, if they dried at all, lakes and tanks for instance. On the subject of drought I may remark here that before we condemn the opening of canals, we should give the matter a very deliberate consideration, when we reflect upon the fearful calamities of famine. These canals may increase the violence of our present epidemics, or originate sickness in some places, but they will save the people from the horrors of starvation and the dreadful death which is its consequence. Besides this, those who do not immediately perish have their constitutions impaired by the prolonged want of the necessary supply of food, and thus become a prey to other causes of disease. I know, since writing the chapter on public health, that the result of the enquiries made as to the effect of the Jumna canals, has been that they affect health very materially, producing fever to an extraordinary degree, and an amount of spleen disease (enlargement of the organ) as its consequence, that appears to me quite wonderful, more than 50 per cent of the inhabitants examined in some places. We are led to put to ourselves the following questions: is fever as rife in localities where purely natural causes only operate? and, if so, is the enlarged spleen as common a result? is this spleen affection caused by fevers produced by irrigation a milder disease than the same complaint in other situations? If not, it would seem that it must depopulate the country in time. To return to the question of canals—we must bear in mind that besides the general observations made regarding the horrors and risks of famine, it would appear from the same enquiries that much depends upon the character of the country through which canals pass, and that much may also be done by skilful engineering to avert mischief.*

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* In the cold season, after it is fairly established, I have not myself met with fever as an epidemic, but I shall presently have to notice it from the experience of others. Dr. Twining and Mr. Martin notice a congestive continued fever as common in Calcutta in some cold seasons.

Remarks on the effect of canals.

Great amount of spleen disease produced by them.

Bad effects can it is hoped be obviated.

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* The Governor General of India has lately sanctioned an annual outlay of 20 lacs of rupees, for completing the Dooab canal, after receiving the report of the committee who were directed to record an opinion on the effect which the present canals produce, and the probable result of making one through the Dooab.

Extract from Dr. Graves, of Dublin, on the nature of miasm.

In the highly valuable clinical lectures of Dr. Graves, of Dublin, I find the following passage: "the malarious origin of fever in general has I may remark become much less probable since the publication of the official documents connected with the sickness and mortality of the British troops in the colonies, and from which, as Major Tulloch reports, it clearly appears that fevers of the most malignant character frequently arise in places presenting to all appearance a combination of circumstances most favorable to the exclusion of malarious influence, while fever is never endemic in other stations where all the reputed sources of malaria exist together." It would be curious to examine in detail the facts upon which the above opinion is grounded, but they are not given. That miasm or malaria is generated in other situations than extensive marshes or jungles can no longer be doubted, and if we deny the production of fevers by this agent we are more at a loss than ever, for we require to discover another cause for them. Dr. W. Fergusson has adduced various instances where intermittent and remittent fevers have prevailed to a great degree without the existence of marsh, or, as far as the eye could discover, any kind of decaying vegetation. I shall mention one or two—1st, on the plains of Rosendaal, in Holland, to use Dr. Fergusson's words, "the soil was a level plain of sand with a perfectly dry surface,* where no vegetation existed, or could exist, but stunted heath plants. Here fevers of the intermittent and remittent type appeared among the troops in great abundance." 2nd, "in the year 1809 several regiments of our army in Spain took up an encampment in a hilly ravine which had lately been a water-course. Pools of water still remained here and there among the rocks, so pure that the soldiers were anxious to bivouack near them for the sake of using the water. Several of the men were siezed with violent remitting fever before they could move from the bivouack next morning. Till then it had

Views of Dr. W. Fergusson.

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* But Dr. F. mentions that water was to be found within a few inches of the surface.

always been believed amongst us that vegetable putrefaction, the humid decay of vegetables, was essential to the production of pestiferous miasmata, but in the instance of the half-dried ravine before us, from the stony bed of which (as soil never could lie for the torrents) the very existence even of vegetation was impossible, it proved as pestiferous as the bed of a fen." I might add many other examples cited by Dr. Fergusson from his observations in Portugal, Spain and in the West Indies; and I might instance the very station whence I write in proof that fevers may be epidemic without the existence of marshy exhalations; but Dr. Fergusson does not for this reason deny the existence of an exhalation or miasm altogether. It little matters what we call it if we recognize it as the exciting cause of fever. What the Dr. says is, that to be mischievous a marsh must be dry to a certain extent, and that the most offensive exhalations may proceed from them while they are harmless. Certainly, I have myself seen immense masses of vegetable matter in all stages of decay, and emitting the most offensive odours without any ill effects even to the people employed in removing it. This circumstance has often excited my attention and wonder at the indigo factories in Tirhoot, the more particularly since the decay of the plant occurred in all conditions as regarded moisture, and often too the vat water holding the juices of the plant in solution fermented and evaporated in the neighbouring ditches and fields.

Remarks and observations of the author.

Is then the Indian remittent in its epidemic form produced independent of miasm—is it the consequence of miasm alone—or is there a peculiar constitution of the atmosphere necessary to produce violent outbreaks in addition to an excessive production of the specific cause? The first question I must dispose of by saying that if we deny the existence of some substance in the atmosphere which produces fever, and which the observation of all ages has connected in general with marshy localities, but which recent researches go to shew does sometimes exist in other localities, and is in both cases independent of effluvium; if

Remarks continued on the causes and nature of miasm.

I say we deny the existence of such a substance, we are thrown upon a sea deeper still to fathom and more studded with difficulties. Electrical or magnetic conditions, barometrical weight, the state of the atmosphere with regard to moisture, prevailing winds, none of these will give us soundings. The two other questions I take up together. We know that the virus of small pox is a specific poison, but we see that the extent of its contamination and its virulence vary in different years. This is supposed to depend upon a general state of the atmosphere influencing the health of the community, and certainly there is nothing to shew that the quality of the poison ever differs.* Remittent fevers we may now say are in like manner produced by a specific cause, and their virulence varies at different times as well as their frequency, the two circumstances not always going together. The greater prevalence might depend upon a more profuse production, but the greater severity, speaking of one locality, would appear to depend upon the epidemic constitution of the atmosphere above referred to. I say one locality, because there are some localities the remittents of which are proverbially severe. Nor does the law stated by Dr. Fergusson to hold good in the West Indies maintain here, that severity decreases according to altitude. In proof of the severity of the fevers of particular localities, I may mention the fever of the Sunderbunds, of the Terai, and of the forests of Malwah, and, as militating against Dr. Fergusson's law, those of the Rajmahal hills and of the table lands of Central India.†

Opinions of Dr. Fergusson again alluded to.

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* Perhaps the strongest proof we have of the existence of a state of atmosphere which effects public health, separately from a poison generated at one time in large at another in small quantities, lies in the fact of epidemics varying so greatly in their fatality, and this often without reference to the number seized with the sickness.

† This fever of the Terai and other forests, does its severity depend upon a special virulence of the poison, or because it is inhaled in large quantities? A traveller passing through will be struck by it in its most deadly form. We observe that in inhabited places the worst localities shew the worst type of fever; but

General observations as to how fevers are influenced by locality.

We may offer as a general observation that though remittent fever may be very prevalent in localities free from marsh and jungle, it is only in localities such as those named above, and I believe I must add in situations where ravines abound, or where the black cotton soil prevails, that the type is always severe, but occasionally there is a departure from the common order of things. "Atmospheric variations may call into action," suggests Dr. Henry, "contagious poisons (I may add miasms) already admitted into the system, but not yet manifested by the usual phenomena; and operating thus over a wide space, and upon numbers, at once may occasion those sudden and violent outbursts of epidemic disease of which numerous examples are on record." This view of the subject will apply well to the state of things here, after a year of extreme drought or of heavy inundation, and particularly to the severe remittent which follows the latter, when the nights begin to get cold, the days being yet excessively hot, with a calm still atmosphere retarding the dispersion of the generated poison.

Dr. Henry's views of the cause of epidemic outbreaks

Applied to this climate.

General history of epidemic remittent.

As we are apt to forget the lessons we might draw from the past, and to be lulled into security by present immunity, I may now trace a brief history of some of the epidemic visitations of this fever, drawing any practical conclusions that may appear legitimate and useful—minute detail will not be necessary. Dr. Johnson tells us from Williamson's Vade Mecum that three hundred sailors used to die yearly out of one thousand and two hundred in the Hoogly, from, as he says, the endemic of Bengal. We may surely call it an epidemic. In Calcutta, says Mr. Martin in his valuable topography so often quoted from, we have no longer such terrible epidemics as those of 1757, with its cold stage of twelve hours, and that of 1762 which carried off fifty thousand blacks, and eight hundred Europeans. It is a most important question to ask why the severity of epidemics has been so greatly reduced in Calcutta, and then to

Dr. Johnson's account.

Mr. Martin's.

Inferences and practical application of their statements.

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that may often be accounted for by the tone of health being lowered by a sojourn in a bad locality. The present is a different question.

enquire whether like effects, if the same means can be adopted, would ensue over the wide extent in the great valley of the Ganges, now subject to visitations of epidemic remittent fever. Mr. Martin attributes the comparative mildness of the fevers of the present day in Calcutta to the improved habits and topographical changes which have taken place; and this the great useful and practical view of the question is sustained by the medical history of marsh localities in all countries. Drainage, improved habits and cultivation have uniformly had a good effect, but perhaps the converse has never been so conspicuously proved as in the case of the Jumna canals already alluded to, and in this instance too we see that the existence of much or rank vegetation is not essential. Besides the mere water thrown from these canals over the uncultivated fields, those on the west of the Jumna in particular act by obstructing the natural drainage of the country. This effect is very remarkable at Kurnaul, where the damp in the walls of houses has increased to an amazing degree, and where water is now found almost at the surface, and where swamps remain during all seasons of the year. In the face of these physical facts, to account for an increased amount of sickness some have maintained that no such effect has ensued, but that a general epidemic influence increased the sickness and mortality, a disheartening view of the subject, as it goes to lower our hopes of what can be done by human efforts. I believe, however, if we investigate physical conditions minutely and locally, we may often find in them sufficient explanation of the virulence of disease in one season as compared with another. "But though ready to allow (says Dr. Graves) the general improvement in the health of the public resulting from drainage, improved habits of cleanliness, and increased comforts, yet I cannot admit that in Ireland we are to expect any notable diminution of continued fever from these causes." He considers the epidemics of typhus in Ireland to depend upon states of the atmosphere accompanied by no conditions which we are yet able to recognize, "occurring in hot,

Measures known to mitigate the violence of fevers.

The subject of canals again referred to.

Effect on the station of Kurnaul.

Discussions on this subject.

Opinions of Dr. Graves as to the effect of drainage on typhus.

in cold and in rainy weather, in the most improved and thoroughly drained towns and country districts, as much as in the most neglected and marshy parts of our island." Though we cannot deny a share of influence to this unknown but recognized condition of atmosphere, it is happily true of our fevers that they are more dependent upon physical causes, and this we might expect when we have some knowledge of the producing causes and of those which prevent them; but we must not forget that though we can sometimes flood a marsh, and make it harmless—give a rush of water through a ravine—gain free perflation, by cleaning away jungles and trees—and in many other ways destroy the production of malaria, or diffuse it—yet there are many things tending to produce malaria and fevers far beyond our power of interference: such for instance as the heavy floods that pour down from the mountain ranges, and inundate the plains at unfavourable seasons, unusual drought, too heavy falls of rain, &c. I return to the subject of particular visitations, by noticing the great epidemic of 1816 mentioned by Mr. Jamieson in his report on cholera. The following is his account of it:

Author's opinion with reference to this climate.

Some physical causes removable.

Others not so.

Mr. Jamieson's account of the fever of 1816.

"In the Upper Provinces the extraordinary scantiness of the rains was yet more remarkable, and was attended by more deplorable results. In the month of July a few showers fell, but they were partial and of short continuance. More generally from Benares upwards, Oude, the districts within the Dooab and those west of the Jumna, were dried up by the long continued and unceasing heats. The parching westerly winds kept blowing throughout August, and the first fortnight of September not a shower fell—and so excessive was the heat, that tatties were in use at Coel, Futtehghur and other stations during the whole of this period. Since 1803, the memorable year of the commencement of Lord Lake's campaigns, no such season had been experienced."

Account continued.

State of the weather.

"As in Calcutta, and about the same time, this long period of drought was succeeded by heavy and incessant rains for many days, and the whole face of the country was laid under water."

"It was not to be expected that so great a deviation from the common course of nature, and such extraordinary and sudden extremes should prove wholesome to the human constitution. We accordingly find that the sickness before stated to have crept in amongst the natives had now become general, and before the end of August was raging epidemically in every town and city between Patna and Suharunpore. It exhibited itself in the shape of a bilious remittent fever, of a violent inflammatory type, accompanied like the yellow fever of the West Indies, with suffusion of the skin; and, unless when cut short in the commencement by bleeding and other powerful auxiliaries, rapidly running its course; and, in spite of every remedy, terminating fatally at the end of two or three days. The width of its range precluded the possibility of its being referred to any causes purely local; and that it was not kept up by infection alone was proved by the indiscriminate nature of its attacks; it seized equally Europeans and natives, and as readily entered the open and spacious house of the officer and civil servant as the crowded barrack of the soldier, or low filthy hovel of the native. The mortality produced by it in Delhi, Suharunpore, Futtehghur, Benares, and other large cities, was very great. In Delhi, of two native corps alone there were five hundred men at once sick in hospital. In Dinapore and at Ramnuggur the troops suffered severely. Of the European flank battalion six hundred and forty-eight strong stationed at Allahabad three hundred and five men were attacked during October; early in November there were at one time one hundred and eighty rank and file and twenty women and children on the sick list; and in the whole only seventy men of the seven Companies of which the corps consisted escaped the disease. But Cawnpore was the principal seat of its ravages amongst Europeans: of four King's Corps, the 24th Regiment of Light Dragoons seven hundred and thirty-five strong, and the 14th, 66th, and 87th Regiments of Foot, eight-hundred and fifty-two, eight hundred and thirteen, and seven hundred and two strong, then in Cantonments, there were

Account continued.

Character of fever.

Effects at Allahabad.

Great sickness at Cawnpore.

from first to last nearly one thousand persons taken ill. The disease here began in August, prevailed during the three succeeding months, and did not finally withdraw until the setting in of the cold weather in December. It was at its height in September and October, eight or ten and sometimes even fifteen men then died daily. The 87th and 66th Regiments suffered dreadfully; from the time of their reaching the station they lost nearly four hundred men. The former corps is said to have had one hundred and nineteen in hospital at once, to have buried twenty-one persons (including women and children) in one day, and upwards of ninety of its number within a month. This is a degree of mortality far exceeding any thing then on record in the medical annals of Bengal."

Moral effect on society.

"The effects produced by so unparalleled a state of sickness will be best understood from the following description written at the moment. The station chiefly affected wore a gloom hardly to be conceived at the commencement of the cold season. Every family was suffering in some of its members. All social intercourse was interrupted, and the only communication between separate families consisted in visits of condolence and consolation. Of numerous native villages nearly the whole population was ill at one and the same moment, and many of the shops were shut for want of people to attend them. The banks of the river were covered at all times with the dead and the dying—such had been the ravages of this dire distemper."

"It has been stated that the disease abated in December. So early as the end of November its attack had become less frequent, and its symptoms milder; but relapses were still common, and it was very difficult to counteract the extreme debility invariably consequent on the attack."

Comments on Mr. Jamieson's report.

Dr. Jamieson remarks that "the width of its range precluded the possibility of its being referred to any causes purely local; and that it entered as readily the open and spacious house of the officer and civil servant as the crowded barrack of the soldier, And practical deductions.

or low filthy hovel of the native." If these remarks are strictly true, they serve to warn us how intensely the exciting cause sometimes operates, so as to prove an exception to the general rule, which assuredly is that local causes aggravate the general one, that low, ill-ventilated, filthy localities are most severely visited, and that cleanliness, free ventilation, drainage and good accommodation are great safe-guards. Adverting to the peculiar severity of the epidemic at this station and to the observations just offered, it would be curious to know whether any great changes have taken place in the drainage and cleanliness of the station since the period in question; it is certain that at the present time there is much room for improvement in both particulars. I often wonder that we escape so well, and would feel no surprise at the outbreak of a severe epidemic remittent; but on the other hand I believe there can be no station in India where sanatory improvements could be made at less expense or with greater benefit. There is upon the whole a very considerable amount of sickness from fever at Cawnpore, and much of it I believe depends on removable causes; and even when states of weather or unknown sources operate in giving rise to severe epidemic visitations, the removable causes will here as elsewhere exercise their own amount of influence in all ordinary cases.

Remarks on the present state of Cawnpore with regard to drainage and cleanliness.

In the India Journal of Medical Science for January 1834, Mr. Corbyn has given an account of an epidemic remittent that prevailed extensively after the rains of 1833 in Calcutta and its suburbs. Many of the observations made in that paper appear to me very interesting and instructive.* "It has been assumed," says he, "that the cause arose from the exhalations from the stagnant mass originating in the inundations which followed the gale in May last. The great objection to such a supposition is the distance of the inundated

Epidemic of 1833 described by Mr. Corbyn.

Extracts and remarks thereon.

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* A writer on Indian diseases ought not to dismiss Mr. Corbyn with the mere mention of his name: few have shewn more zeal, industry or independence.

low lands from Calcutta." How strange that the Doctor should not have thought of the distance of time as well as that of space. The inundation spoken of took place in May, while the fever prevailed in September, October and November. In the following remarks, according to the views I entertain, there is much that is interesting and instructive—" Now it is one striking fact with regard to this rainy season, the falls have been exceeding small, of short duration, and several days between, scarcely washing away the filth and dirt which had accumulated in various spots, and not doing more than wetting the roads about Calcutta, never even rendering those which are muddy impassable an hour after each fall." The above substantiates my views that unusual weather, be it too wet or too dry, may cause sickness. I go much further than this, and consider that there is a regular standard of weather for each place, any material deviations from which might warn us to prepare for sickness, if we had almanacs made up from a prolonged average of observations. The next quotations are interesting on the general question of the sources of malaria, and on the local peculiarities of Calcutta in that respect—" the fever, however, was most destructive at Garden Reach, Entally and Allipore, at which spots there is abundance of material for the greater quantity and worst quality of that poison. Garden Reach is in a most neglected state; the tanks are filthy, vegetation is considerable, and the stench of vegeto-animal matter must be observable to every one who is in the habit of visiting that quarter at the termination of the rains." The next extract has a peculiar local bearing, but a general one also, for which last reason chiefly I quote it—" as for this City of Palaces, as it is called, its elegant buildings are surrounded by native huts, stagnating pools, and some of its tanks which are so much admired are in many places the source of disease. I am aware that it is laid to my charge that I am prejudiced against tanks, and that it is my desire to see them all filled up: but I beg to say that I am not prejudiced, contrary to the views of science

State of weather.

Remarks by author as to how weather affects disease.

Extracts continued from Mr. Corbyn's paper.

Local agents prevailing in Calcutta.

Mr. Corbyn's observations regarding tanks.

And the general sources of malaria.

and experience. I know it to be a fact ascertained not only from my own observation, but by such men as Trotter, Lind, Jackson, Rush, Johnson, Chapman, Fergusson and others, that although the pestiferous quality of malaria is not generated from the body of the tank, it is from its drying or half dried margins, if those are not built up with brick faces. Water without being absorbed by the adjacent soil gives out no morbific effluvia." Here we will take for granted, with reference to our own previous assumption, that by effluvia Mr. Corbyn does not mean actual smells. I believe that they may accompany malaria, but that they are not essential to its presence. To resume my extract from Mr. Corbyn's paper—"febrific malaria is generated from the paucity of water, where it has been previously absorbed, when that paucity is short of actual dryness; to the production of this the high atmospherical temperature of September, October, and sometimes of November is necessary. In proportion to the intensity of temperature so is the intensity of the power of malaria obtained, varying its effects upon the human body; the space of time which intervenes between the application of this insidious poison to the system depending however not only on the degree of its concentration aforesaid, but also on the predisposition of the patient." I make one more extract from Mr. Corbyn's paper—"deep ravines impervious to the rays of the sun and free currents of air, that have been water-courses have, after their surface has appeared dry, retained sufficient moisture to give out the most dangerous miasmata, the more dangerous because the more concentrated for want of perflation; and in fine salubrious and insalubrious soils under such circumstances change character in regard to health; and localities in the neighbourhood of each under the same modification of climate may be very differently affected." And then Mr. Corbyn goes on to mention that when the ditch of Fort William was kept full in the rains at his suggestion, a great improvement in the health of the inmates of the fort

Ravines and imperfect perflation.

was the consequence, and that when the measure was discontinued severe sickness ensued, particularly among those inhabiting accommodation near the ground.

The next epidemic fevers which I have to notice I feel to be of far greater importance than any others which I have hitherto alluded to, and this for three chief reasons:—1st, they have been recent, wide-spread and malignant in character; 2nd, they have met with a fuller investigation than is common to the epidemics of this country; and, 3rdly, they have been looked upon by the local observers whose account I am about to give to have taken on a contagious character, and though this part of their history is opposed to my own observation and to the inferences I draw from my reading, those who hold a different opinion with the great advantage of local and individual observation shall be allowed to speak for themselves. It will be anticipated by many of my readers that I allude to the outbreak of disease which in 1836 excited so much interest and alarm under the name of the Pali plague. If Rajpootana alone had been visited, perhaps I might have left it unnoticed, seeing that with respect to geographical position I have intended to confine my observations to the climate and diseases of the provinces lying in the vicinity of the Ganges; but these provinces were also visited by severe epidemic fever, and a view of the whole extent of mortality will I think be instructive, as it will show more prominently the dependance of disease even if contagious for its virulence on cognizable physical conditions, many of which are removable by simple means, on adopting which an improvement in public health would surely follow. These practical and useful views, and great because practical and useful, are those which it affords me the greatest satisfaction to inculcate, a satisfaction, however, which would be greatly enhanced if I were certain that the authorities in this country are yet or soon likely to be alive to the interest or humanity of protecting the health of the population by measures of conservatism. The reader is about to be presented with abundant

Great epidemics of 1836-37.

Their interest, because malignant, as they were investigated and were supposed to be contagious.

This view opposed to the author's experience.

Great practical deductions to be drawn from their history.

As they suggest measures for improving public health.

Authorities not yet alive to their necessity.

Author's tribute to the humanity as well as the glory of the British rule in India.

proof that in the villages of Hindoostan far from its thickly inhabited and ill-ventilated towns there exist local sources of disease which are easily removable, and it is to these I am always solicitous to draw attention, because they are tangible and remediable. I am at the same time, however, very anxious not to be supposed to write of authority in a cavilling or disrespectful spirit: I am acquainted with the blessings which the British rule has conferred upon the vast population of British India—the protection which it affords to the life and property of its subjects—the humanity with which it has striven, and in many instances succeeded, in putting a stop to the horrors of suttee and infanticide—and the noble desire for the progress of human society which it has evinced by its efforts for the spread of knowledge and education; but political medicine is a department of government not yet much appreciated even in European countries, and yet it is clearly as much the interest and the duty of a government to protect the health of its subjects as it is to defend their lives and property from spoliation. Above I have offered the tribute of a humble but practical observer to the glories of the British rule in India, the glories of an enlightened and humane civil government, that will gain the applause of posterity after deeds of arms are forgotten; and having also knowledge of the talent, zeal and philanthropy of those who are employed in the detail of administering it, I here make an earnest appeal to them to bestow a share of attention on a subject which might be productive of a large increase of human happiness.

Pali disease described in the report of Dr. J. Ranken, & Delhi and Rohilcund fevers.

An account of the Pali disease of 1836, and of the deadly remittents of Delhi, Moradabad and Mynpoori of 1837, will be found in an able report drawn up by Dr. James Ranken, who, being at the time officiating Secretary to the Medical Board, had access to all the records which exist on the subject. From these he has drawn his own conclusions, which sometimes differ from those whose reports are canvassed; but as far as I am able to judge differences in names are sometimes mistaken for real differences in opinion.

Epitome of history of the Pali disease.

The history of the Pali disease is first given, and I may proceed to offer a short epitome of it by extracting from Dr. Ranken's report, and the statements of the other medical officers who had opportunities of observing it. I may be permitted to remark upon the noble fearlessness and zeal evinced by these officers in following up an enquiry, by fatiguing investigations pursued on the very localities where a malignant disease was prevailing, considered by themselves to be contagious. Messrs. Maclean, Irvine, Keir, and Russel were the officers I here particularly allude to.

Meritorious conduct of the medical officers on the spot.

### EXTRACT FROM DR. RANKEN'S REPORT.

History.

"In the month of July 1836 a destructive fever broke out in the principality of Joudpore or Marwar, at Pali, a considerable town, which is reckoned the emporium of the trade between Central India and the seaports of Guzerat. A number of families in this place, amounting to about two thousand persons, called Cheepahs, who lived by printing the pieces of plain cloth brought from the coast, were the first affected with the disease, and six hundred and fifty-five of them died; the Bramins next, then the Mahajuns or retail merchants, and the inhabitants indiscriminately, were taken ill in succession.

Of the fifteen or twenty thousand people whom Pali is believed to have contained four thousand perished at the rate of fifty or sixty daily. Before the mortality abated all the wood procurable for burning the dead was expended, and corpses had to be consumed with the shells of cocoanuts and the butter commonly used as food. The survivors of their kindred and most of those who escaped the malady evinced from an early period their conviction of its infectious character, by deserting the town and seeking refuge in the neighbouring villages. The neighbours of these fugitives entertaining similar dread of infection often refused them shelter, yet many of the persons who left Pali in this manner finally got admission into the houses of their friends, and wherever they took up their residence the fever shortly afterwards appeared. A few places, it is reported on uncertain authority, by persisting in holding no communication with the infected spot, continued healthy; but in general all the villages amounting to twenty-four within a circuit of thirty miles of Pali, speedily began to suffer from the distemper, which seemed to originate there. In September the epidemic had extended to Soojit, a town containing six thousand souls, and by October it reached Joudpore, the capital of Marwar. We find it next, after affecting the single village of Dewair in the intervening district of Mhairwarah, where it destroyed four hundred persons, passing over that hilly tract to Deoghur, in Meywar, whence it skirted the same hills on the north east, as it had previously done on the south west side, for fifty miles, by Loosanee thannah and Bednore, to Jaha and Ramghur in the district of Ajmere. These events occurred successively in January, February, and March; in April 1837 the sickness was announced at Bhilwarah and Humeerghur, towards the British cantonment of Neemuch, on the road between that post and the military station of Nusseerabad. Having thus briefly indicated the course of the epidemic, I must refer to the map for an enumeration of all the small places, comprising thirty-two villages of Meywar, to which it finally extended.

History continued.

With respect to the mortality which the malady occasioned no certainty is attainable. The terrified people so early as May last had magnified their loss to one hundred thousand in both principalities. Lieutenant Colonel Alves, political agent in Rajpootana, then reckoned the deaths in Marwar at twenty thousand, including six thousand in the city of Joudpore. About the same time Lieutenant Colonel Speirs, political agent in Meywar, computed the number of victims to the sickness in that state at seven thousand and twenty-two. According to the concurring estimate of the medical officers who saw and treated the fever, not more than one-third of the sufferers survived."

State of the weather—topography of the country—& habits of the people.

It is I think much to be regretted that we have very little notice of the states of weather which preceded the outbreak of this great epidemic, or accompanied its progress. It is indeed mentioned in one or two of the reports that the weather was unseasonable, but there is nothing more.* The physical character of the country and the habits of the people are more particularly described by Dr. Ranken.

Topography of Rajpootana.

"The face of Rajpootana in Jeypore, Oudeypore, and part of Joudpore, is a succession of sandy valleys interspersed with ranges of low and rocky hills. These hills collecting the rain as it falls at irregular periods, and giving it out at others, seem to act as reservoirs in supplying the intervening plains with water, which in ordinary years is generally found near the surface. The spontaneous produce of the country is chiefly reeds, brushwood and stunted trees—no fine grass or herbage, no stately forests appear in those regions, which, though looking like a desert, are not unfruitful under the appropriate husbandry."

"Of Marwar or Joudpore we know less than perhaps of any principality between the Indus and Bramapooter. A portion of it is said to be clayey, and to abound in marshes during the rainy and cold seasons. Frequent droughts followed by consequent famine and disease occur there. In 1833 a destructive epidemic, and in 1835 fever, raged among the villages. I have heard of no extraordinary sickness in 1835. During that and the subsequent year no marked irregularity distinguished the seasons, and our troops in the western district which adjoins were very healthy. In confirmation of these general views of the causes of disease in Upper India, I will now cite descriptions of the special seats of the Pali fever, as given by the medical officer who visited them. Mr. Maclean mentions a small lake, the filthiness, bad ventilation, narrow lanes and ba-

Localities described where the disease prevailed.

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* Extract of a letter from Mr. Maclean: "It ought to be remarked, however, that the season was altogether unusually mild. The temperature has been hitherto below the usual average of this period of the year, and the winds have been peculiarly irregular and inconstant."

zars of Pali itself; and I learn from other quarters that warehouses, cattle sheds, masses of dung and human ordure, with the common density of population within its confined limits, prevent its ever being swept by a wholesome breeze. The following passages will be found in a letter of Dr. A. Keir, printed entire in the appendix.

"The village of Jumari is situated on the Marwar or north western side of the Arvalla range. A very considerable part of the country immediately adjoining the village is under cultivation, the crops being wheat and cotton, but chiefly the former; water is abundant and procured near the surface, and the place in every respect appears to enjoy many natural advantages. The agreeable indications of prosperity, however, are to be discovered neither in the appearance of the place nor the people. The village I was told consists of not less than five thousand houses, but these are of the worst and meanest description. The inhabitants may probably amount to about a thousand, and are for the most part chumars and bunyas with a certain proportion of brahmins. The town like most others in Marwar is abundantly filthy, the cattle being either the actual inmates of a number of the houses, or apart in folds as close to them as possible. The collection of nuisances that this order of things give rise to may readily be conceived, nor can we suppose the effect to be otherwise than injurious as regards the health of the inhabitants. Indeed, the most studied art could hardly devise a more effectual plan for nuisances every way offensive, than that universally prevailing among the people of Marwar and Meywar—I mean the plan of running immense dry hedges composed of the branches of prickly shrubs, bushes, &c. not only round the town as a defensive outwork, but into every crevice and corner where there may be the possibility of egress or ingress to man or animal."

Description continued.

The next quotations are from the official communications of Mr. T. Russel, Assistant Surgeon, 1st Cavalry.

Ditto.

"The town of Gungapur is thirty-two miles N. W. of Chitpore, situated at the foot of a hill with a small lake, at present nearly dry, close to the east. The place consists of five hundred and forty houses and two hundred shops built of mud and stone, not high, in narrow dirty streets, with cattle, dogs, and all kinds of filth lying about. Primalu I reached on the 14th (yesterday)—it is a miserable wretched place near the Bunass, containing five hundred houses of the meanest and most filthy description. I have not been able either here or at Gungapur to find out the average population, but they appear poor people, principally engaged in dyeing and printing cloth."

Interesting points to discuss regarding the disease.

The most interesting points to discuss, with reference to this fever, are, 1st, whether it was really an imported disease—2ndly, was it the plague, whether imported or not—3rdly, was it beyond doubt contagious.

Was it imported?

The question of the importation of a disease is always difficult; there is ever a disposition on men's minds to attribute unusual invasions of disease to this cause, while it may be added, as Dr. Ranken has justly remarked, that the progress of medical opinion tends the other way. Epidemic invasions being more attributed than formerly to local contaminations or conditions of developement, and even when a foreign contagion can be traced, it requires a local nidus to make it prove an epidemic. In other words, it will not act on a number, unless from some cause they are in a state predisposing them, or may be we should say unless local circumstances favor its action. Of the importation of the Pali disease, to return to that particular point, the evidence is scanty and almost conjectural. We will admit that its first appearance in the town of Pali is a fact established and unquestionable, though, if inclined to cavil, we might hint at the extreme difficulty of being able to prove this in a country like India, and especially in a province not under our immediate rule. That it reached Pali from any of the countries in which plague is said to be endemic there is only this much to prove: a class of travelling dealers called Seits are in the habit of bringing cloth merchandise from Surat to Pali—these cloths are purchased by dyers in the town, called

Cheepalis, and it was among them that the Pali disease first appeared. There is not a tittle of proof to shew that the disease broke out suddenly on the opening of the bales of cloth—that any of the carriers were affected—that such a disease prevailed at Surat—or that cloth goods came to that part from any plague country. I will only add on this branch of the subject (which is not after all of great practical importance, as we have only to consider it retrospectively) that if the disease was really plague, and we know that plague is only endemic in certain countries, we may take its importation for granted without being able to trace it in this particular instance; if on the other hand it was plague, and plague can arise without the conveyance from another country of its specific contagion, there is no occasion to pursue the argument regarding importation.

Was it the plague, whether imported or of local origin?

I am next to consider whether the disease was plague—whether imported or not—and I at once express my own conviction that it was. Dr. Ranken expresses a different opinion, considering that it was a fever of local origin wanting according to his belief in some of the specific characters diagnostic of true plague. I shall proceed to notice the arguments adduced by Dr. Ranken, and bring forward on my own side of the question those which have been advanced by the medical officers who had an opportunity of seeing the disease. If I do not do justice to this complicated question, I must plead in excuse varied and constant professional occupation, which forces me to break off the train of my references, and the inferences deducible from them, at all hours and seasons. It is now that I have to notice what I consider to be differences in names more than opinions on the part of the officers whose reports I am commenting upon. Dr. Ranken says this was not plague. 1st, because the plague is not known by tradition in India, or in our own experience. To this argument I oppose that we are not well acquainted with the past history of disease in India; that according to some there are notices of invasions of disease,

Opinions of Dr. Ranken and the other medical officers discussed.

Tradition or history of plague in India.

which may have been plague;* that it has recently been thought to have prevailed in the Bombay presidency; and, lastly, in answer to this argument I adduce the late prevalence of cholera in European countries, and especially in America, and the known truisms that every disease must begin some time, and that even in countries where plague is undoubtedly endemic it has periods of increase and decline.

Arguments from the existence of buboes, and the non-appearance of carbuncles and petechiæ.

This was not plague, again says Dr. Ranken, for it is known that buboes appear in other bad fevers besides the plague, and in this epidemic there were no vibices, carbuncles or petechiæ. Here it seems to me we have two points to deal with—first, whether the circumstance of buboes appearing in other fevers proves that this was not plague—secondly, whether the true plague has ever been known without the appearance of carbuncles, &c.† It is not to be denied that buboes occasionally appear in individual cases of other fevers, for proofs of which I must refer to Dr. Ranken's report, page 22, &c.; but it appears to me that the reports of the medical officers who examined so many cases on the spot shew that buboes prevailed to a far greater degree in this outbreak than has ever been seen in any ordinary fever, and its mortality entitles it to the name of a pestilence. As to the non-appearance of the carbuncles, &c. I may refer to the history of plague in the learned Dr. Mason Good's 3rd vol. of the study of medicine, in proof of my own belief that the true plague may exist and has existed without them.‡ Dr. Ranken's argument, grounded upon the existence of a malignant fever in Kumaon, appears to me of little value, because the history of the disease is obscure, and we have no proof that it was not really the plague.

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* History declares, says Dr. Irvine, that at one period a most fatal contagious plague desolated the whole country.—*See also Dr. Keir's report on this particular head.*

† It is scarcely possible to give such a definition of the plague as applies to every case, as it exhibits almost an infinite variety in its appearances and degrees.—*Encyclopedia Edinensis.*

‡ In Turkey the plague is distinguished into five or six varieties.—*Encyclopedia Edinensis.*

The occurrence in many cases of hæmorrhage from the lungs is another strong proof to me of its having been plague, for this symptom is often noticed by writers on the plague.

Argument from the appearance of malignant fever elsewhere.

The existence of malignant fevers in the neighbouring parts of India of a very severe character, and supposed to have spread by contagion, appears to me to go further in favor of Dr. Ranken's views than any thing else he has stated, excepting the great point of non-communication by contact; and this it is evident Dr. Ranken himself considers the stronghold of his argument. After giving authorities regarding the communicability of plague by contact, he sums up as follows: "none of the medical officers, or their native assistants, who handled patients affected with the Pali disease, and felt their pulses for days and weeks, have suffered."* According to the views I entertain, these facts would appear to go far against the proof that plague is always, if it ever is, conveyed by the mere contact of one person with another. Usually those who are exposed to contact are also exposed to the same local influences as the sick, and to the inhalations of the exhalations from their bodies concentrated and undiluted. Here it was different, and mark the consequence—and assuredly there is something required besides contact; or would it be true that after the 24th of June in Egypt no ill effect is dreaded, or indeed ensues from it? I quote the following from Magendie's Lectures, to shew that the question of contact is not yet solved, and that it is opposed to the known laws of the animal economy. "This is a circumstance which requires to be well, extremely well, established before we can believe it, for it is contrary to all we know of the history of diseases, and of the phenomena attending imbibition. It would follow from this fact that the poisonous germ of the plague passes readily through the epidermis, and is transmitted with difficulty

Argument from non-communication by contact.

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* We may regret that the test of inoculation was not tried, but it s curious that even on this point authorities are not agreed.—*See Clot Bey on the plague in Egypt, Lancet, vol. 2nd*, 1839-40. I am myself of opinion that it has been fully proved that the plague can be produced by inoculation.

through the membraneous tissue of the lungs, a phenomenon I say directly contrary to our experience of all other diseases."

Besides what I have stated and quoted above, it must be added that a few individuals not having suffered (presuming the proof of plague being communicable by contact to be undoubted) is, I submit, but a meagre amount of negative proof. Let me next notice the arguments adduced by Messrs. Maclean, Irvine and Keir, in proof of the Pali disease and plague being identical: "from a comparison of the symptoms of the Pali malady," says Mr. Maclean, "and consideration of the circumstances connected with its origin and progress, I cannot help arriving at the conclusion that it is no other than the plague, though happily not in its worst form."

Quotations from the reports of Maclean, Irvine and Keir.

Dr. Irvine's testimony has the additional value, that before seeing it he did not consider it plague, and had recorded his opinion to that effect. After he did see it,—the following is the emphatic language he made use of: "I have studied a number of cases, from the first attack to the fatal termination in three days, and many patients whose disorder had existed previously to my arrival I have attended subsequently throughout, to the period of recovery or death. From this experience I have no hesitation in defining the present disease as the true plague, i. e. a very malignant fever of a putrid and contagious nature, characterized chiefly by buboes"—and in another place, "since the period first alluded to, I have again visited the plague infected villages, and am more confirmed in my opinion that the disease is bona fide the same as the pestis known to have occurred in Egypt, Malta, the Ionian Islands, &c."*

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* It is a remarkable fact that the clothes of persons who have died of the plague are openly exposed for sale in the streets of Smyrna and other cities of the Levant, and fearlessly worn; and that during the invasion of Eygpt, in the beginning of the present century, the Turkish soldiers dug up the dead bodies, and appropriated the clothes stripped off them, without receiving or communicating the disease, though it was raging in the country.—*Encyclopedia Edinensis.*

Dr. Keir, in his letter to Mr. Superintending Surgeon Panton, of the 6th March, has gone at great length into the question of what is to be considered as the true definition of plague, displaying much research, and argueing the question with great ingenuity. I must be content with offering to my readers, the conclusion he arrives at.* "Looking at the disease generally, and taking the symptoms not as they have occurred in individual cases, but as they have occurred among the great body of sufferers, we assuredly have plague in its most genuine form. We have buboes, or at least swellings, in the greater number of instances—we have a disease (leaving out the quibble of contagion) remarkably prone to diffuse itself, and to those attacked almost as fatal as any epidemic that has yet made its appearance."

Extract from Dr. Keir's report.

Question of the contagious nature of the Pali disease considered.

I might consider the contagious nature of the Pali disease with reference to the general question whether plague itself be contagious, but I prefer confining myself to an examination of the evidence regarding the contagious character of this epidemic in particular.† If we confine the definition of contagion to the communication of disease from one diseased person to another by contact, or by a proximity that leads to the inhalation of the breath of the sick person, our evidence is meagre with reference to this epidemic. We have but a few cases received on hearsay, parole evidence, on the positive side, while on the negative side of the question we have the fact, as already stated, of none of the medical officers having suffered, or their assistants, who handled and tended the sick. Enlarging the view of contagion to the power of the human body to evolve a materies morbi, that

Contagion by contact or proximity.

By diffusion in the atmosphere.

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* Dr. Keir quotes the following obervation: "why plague has been referred to the exanthemata is not very clear, unless from the occurrence of carbuncles and petechiæ, neither of which is of constant appearance."—*Winterbottom.*

† "There being no doubt that the plague is raging in Rajpootanah."—*Preamble to the minute of Sir Charles Metcalfe, then Lieut. Governor N. W. Provinces.*

under peculiar circumstances will affect another individual, we have strong evidence that this disease was so communicated; but I must still confess that even on this point the evidence standing by itself is not altogether conclusive, and requires the support of a previous knowledge of the laws which similar diseases are known to observe. Let me now give a general view of what was really observed with regard to the spread of this fever, and then draw the practical inferences. We are told that it commenced at Pali, whence part of the population fled, and after their arrival in other particular places there the disease appeared. Any one who is acquainted with the character of native testimony, and with their indifference to the prevalence of disease 'till their attention is called to it, might question the authenticity of the narrative of the spread of the disease which has been given to us;* but believing myself that malignant fevers, the original cases of which arose from mere atmospherical causes, do probably become convertible into such as produce a virus by the vital actions which, applied under favorable circumstances, will induce a similar disease in another, I do not doubt that human intercourse may have carried it from one place to another. Besides the positive proofs of this, attested by the local enquirers, there are the negative ones—that it did not enter our stations of Neemuch and Nusseerabad, where precautions were taken, and that in particular the disease did not enter the hilly territory of Mhairwarrah, (except in one locality, and in that intercourse was traced) round which Captain Dixon had placed a cordon, to prevent all ingress of people from the affected places.

General history of the spread of the disease.

Proofs of the influence of local contaminations.

But if this disease was really communicable from one individual to another, direct or by means of the atmosphere and

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[*] So little general alarm indeed had the pestilence caused, while it was yet confined to Marwar, and so little notice had been bestowed on its progress, that the discovery of its existence at Jailah was owing entirely to the accidental arrival near that place of the camp of the G. G's. Agent.—*Maclean.*

other media,* the information we possess clearly proves that favoring conditions of locality were requisite at any rate to its becoming virulent, and perhaps to its propagation at all. "I myself," says Dr. Maclean, "spent hours in the middle of the bazar surrounded by the sick, entered some of their houses, touched and examined their bodies as freely as if they had been affected with any common disease, and now, after an interval of five or six days, during which I have undergone considerable bodily fatigue, feel perfectly secure from any attack." Clot Bey tells us he often did the same in cases of undoubted plague, yet Tully says that to touch a plague case is almost certain death.† What a thing is human testimony, and how difficult to reason on some things, even when we have facts to go upon. But to return to the subject of the influence of locality—in the Pali disease we have the testimony of all the medical officers that it affected filthy, ill-ventilated localities; that they were themselves able to visit such places for a time, and to touch the sick with impunity; and that removal of the inhabitants in some instances to clean, well-exposed and ventilated positions was immediately attended with good effects.

Extract from Dr. Maclean's report.

The practical conclusion to draw from all these facts is obvious enough, and the importance of it is second to no other that can engage the attention of a medical enquirer as a matter of interest, or of a government as a matter of philanthropy. The great pestilences which afflict the human race in India, cholera, fever and small pox, are all greatly enhanced in their virulence by filthy habits, aggregation of people, and bad ventilation.

Practical inferences.

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* In an article in the last No. of Forbes' Review. there is a theory promulgated, or rather a hint thrown out, that some morbific agents may have the power of producing or increasing themselves in the atmosphere, as a small quantity of yeast sets up fermentation.

† The difficulty of this question of contagion strikes one more the more he studies it; after what I have read on the one subject, and what I have seen of the other, I find with great surprise that Dr. Copland, in the 10th number of his Dictionary of practical medicine, still maintains that yellow fever and cholera are contagious.

The malignant fevers which prevailed in the same year as the Pali pestilence in the districts around Delhi, at Mynpoori and in Rohilkund, were undoubtedly produced by local and climatic causes; but here too we have the testimony of some of the medical officers to their having become contagious. We have also the same melancholy picture of filthy sites, and ill-ventilated towns, streets and houses; and the observation I have so frequently made, that unusual states of weather accompany severe outbreaks of disease, is here again borne out, though it is to be regretted that we have not many or defined observations on this head. I am reluctant to offer extracts confirmatory of what I have stated, because I entertain some fear of being accused of filling up my pages with the labor of others.* I must therefore refer to Dr. Ranken's report, and to the transactions of the Medical and Physical Society of Calcutta, vol. 8, part II. The references will prove that the weather was unseasonable, that numerous local sources of disease existed, stagnant, half-dried up marshes, animal and vegetable filth, dense crowding and bad ventilation in the villages and in the jails;† in short the difficulty is to say why there is not a pestilence every year. I would willingly again handle the question of contagion here, not satisfied in my own mind that in this instance it is quite established.‡ The proof I admit to be very strong, as it appears that some time after sick prisoners had been brought into the Mynpoori jail, the attendants on

Notice of the fevers prevailing in Delhi, the Dooab and Rohilkund, in 1837.

States of weather.

Author's reason for not offering quotations here; refers to the reports of Dr. Ranken, the late Dr Sheriff, Mr. Guthrie, Dr. Macnab and Mr. Spenser.

Unusual states of weather and local sources of disease were present.

Question of contagion.

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* The reports are written by the late Dr. Sheriff from Rohtuk, Mr. H. Guthrie from Bareilly, Dr. Macnab from Mynpoori, and Mr. Spenser from Moradabad.

† From October till March, 104 prisoners died of this fever in the Bareilly jail. The general mortality was very great.

‡ The mildest form of fever to which malaria gives birth is the intermittent or ague, but in climates and places where it exists in greater abundance and intensity, the fever becomes remittent, or even assumes the continued form. This has led to strange errors—fevers which spring from the malaria, and which are never contagious, are confounded with the severe continued fevers usually called typhus, which are unquestionably communicable from person to person.—*Watson's Lectures.*

Proofs of.

Objections taken by the author.

Further arguments in favor of contagion in this epidemic.

the sick, including both the native Doctors, were siezed.* It would have been highly satisfactory if we had had a clean bill of health from Dr. Macnab for the jail and town of Mynpoori at this time, (especially for that part of it in which the parties attacked had their dwelling houses) and more especially since he mentions that Mynpoori and other parts of the Dooab had severe visitations of a similar fever during the previous year. The time of year during which this fever prevailed is another reason why we might not doubt its becoming contagious, and we might add to that the decidedly typhoid character which it manifested. It commenced in December, and continued till the setting in of the hot winds, and again appeared to some extent during the rains.

General observations regarding this fever; the resemblance in some respects to yellow fever, and in others to typhus.

Its history unfavorable to the reputed salubrity of the Upper Provinces.

It is curious to remark of these fevers generally, that in some respects they bear a resemblance to the yellow fever of Spain, America and the West Indies. Their mortality, their generally remittent character, and the yellow suffusion of the skin, mark this resemblance. In other respects again they have characters in common with the fevers of colder countries. Their occurrence in the cold months of our climate—their typhoid symptoms, their inclination to run into the continued form, and their in all probability contagions character. justify the observation. I may also remark of these fevers, that their history has led me to consider the climate of the North West

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* The following is the list of servants, &c. with the remarks by Dr. Macnab.

| | | |
|---|---|---|
| Washermen, | 2 | |
| Native Doctors, | 2 | |
| Cook, | 1 | |
| Sweeper, | 1 | |
| Bunyah, | 1 | Several of these caught the disease in the building without the walls of the jail, nearly half died. |
| Oilman, | 1 | |
| Convicts. | 7 | |
| Attending in hospital with other ailments, | 4 | |
| Burkundazes, | 3 | |
| Total, | 22 | |

Provinces to be more unhealthy, and to differ more from Behar, the field of my own observation, than I had supposed. There I never met a fever I could consider contagious, nor any of such asthenic type. There are other circumstances, too, which mark as it were a gradual approximation of the climate of the Upper Provinces to that of colder latitudes in other countries. I allude here to the general character of disease, but more especially to the prevalence of pneumonia, rubeola and phthisis.

Notice of a peculiar remittent accompanied by eruption lately observed by the author.

Described in Calcutta in 1824.

Subsequently by Professor Goodeve.

I am next to notice a form of remittent fever, attended by a peculiar scarlet-colored tingling eruption. This fever has lately attracted my own attention at this station, and to my observation, as compared with the history given of it by others, this particular invasion has presented peculiar and eccentric characters. It is in all essentials the eruptive fever described by Drs. Mellis,* Twining, Mouatt and Waddell, as prevailing so extensively in 1824 in Ava and over a part of Bengal; and there is a later notice of it by Professor Goodeve, as it visited Calcutta in later years, vide his paper in vol. 9, of the Medical and Physical Transactions, 1844. page 142. It is indeed a curious circumstance that one so conversant even with the Indian history of his profession should have overlooked the previous accounts of this disease mentioned by me above.

I have before me the descriptions of the authors whose names I have mentioned, and there can be no question but they describe the very fever which Professor Goodeve considered he was the first to bring to the notice of the profession. This of itself would seem to shew that I have not been mistaken in supposing that this brief and imperfect history of Indian epidemics may serve some useful purpose. The features borne in common by the recorded invasions of this fever have been a

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* Dr. Mellis shewed that the fall of rain and range of temperature did not vary from the common standard; but he has given figures to shew that there were many more days with sultry cloudy weather, and much less lightning than during the previous year. The disease appeared here after a long period of rains followed by close sultry weather.

General character of this fever.

remittent form of fever, accompanied at some stage by a florid eruption prevailing chiefly over the face and hands; another feature common to this fever over a series of years would seem to be that, though the symptoms are formidable, the disease very seldom has proved fatal, perhaps never, except in cases where from other causes there existed a great tendency to death. The disease described by Dr. Mellis had much more of an ardent type than what I had an opportunity of observing here, in which the symptoms did not run high, yet was the disease, as I saw it, in most cases followed by a degree of debility, far out of proportion to the violence of the attack. This has been observed as another fact applying to the disease, whenever or wherever it has prevailed.* The invasion of this disease which came under my notice singularly enough confined itself to the officers of the 44th N. I., while at the same time a great number of the men of the Regiment were in hospital with attacks of common remittent and intermittent fever. The corps had come from the hill fort of Kangra in March last, and occupied that part of the Native Infantry lines which faces the European Infantry barracks. The officers of the Regiment lived in a continuous range of bungalows on a ridge pretty well raised, and apparently well drained, though there is higher ground in the vicinity. Not a stone throw off many of the officers of H. M. 21st lived, but not one of them had the disease, nor did it shew itself in any other part of the station, if I except one case at Nawaubgunge, the civil station. Hardly an officer of the 44th escaped an attack; in some, however, it was extremely mild. I saw no positive proof of contagion, and much negative proof against it.† The peculiarly local nature of the epidemic

Peculiarities of different invasions.

Brief account of the disease as it appeared at Cawnpore in 1847.

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* I find a notice of this fever having prevailed in Guzerat during the hot months of 1824. In this instance, if it was not scarlatina, there was a near approach to that exantheme; the eruption appeared on the third day, and was accompanied by throat symptoms.

† The men of the 44th suffered much more at this time from fever than those of the 13th, hutted close to them. I am safe in stating that upwards of three hundred men had fever in some form,

was very singular, and to mark this still more I may mention the fact that besides the case I have mentioned at Nawaubgunge I heard of no other out of the lines of the 44th, except in the instance of an officer of the same corps, who lived in a different part of the station, but was in the daily habit of visiting his brother officers. He had the fever, and was the only member of his family attacked with it.* Drs. Mellis, Cadell, and Mouatt have dilated upon the wide-spread nature of the epidemic of 1824, and there is no hint of its confining itself to Europeans, as noticed by Dr. Goodeve, and as was assuredly the case here, but much and positive evidence to the contrary.† Another curious thing to notice is, that though Dr. Mellis describes the eruption, "we not only found the skin turgid," he says, "and of a red scarlet color, but in many instances an eruption or rash appeared on different parts of the body, of a similar color, and of various extent." Yet he makes no allusion to its being critical, though Dr. Goodeve particularly insists on this part of its character. "The fever," says he, "always subsides upon the outbreak of the eruption, and never re-appears in the secondary form." In my experience the face became red, and the eyes suffused, with occasional tingling and flushing on the hands and feet, while the fever still remitted and exacerbated, but at length a free outbreak of the eruption became critical, and the skin peeled off partially. The state of the tongue was very distinctive, at first red towards the edges, but furred in the centre, gradually cleaning from the edges and leaving a bright red surface, as in measles. There was the pain in the limbs so prominently noticed by the writers whose names I have noticed, but it was not nearly so urgent a symptom as some of them have described it.

Disease compared with that described by Dr. Mellis and professor Goodeve.

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yet after enquiry I cannot learn that there was one instance of eruption. (*Written in January* 1848.)

* This officer had not been at Kangra.

† I have never seen the complaint in those born in the country from European parents, or amongst East Indians who have never left their native land.—*Dr. Goodeve's paper.*

### INTERMITTENT FEVER.

Its history mixed up with that of remittent.

The subject of intermittent fever need not detain us long in this place—its history as an epidemic being mixed up with that of remittent, of which it is an accepted doctrine that it is but a milder phase. Writers have noticed its greater prevalence in the cold season, when remittents disappear. I have had to mention a few pages back the most deadly remittents prevailing in our cold months, and I have often seen intermittent in the hot months and rains. It appears to me to admit of doubt whether the causes that give rise to a common intermittent and to such deadly remittents as I have been describing, and as are known to be endemic in some localities, can be considered specifically identical. It has occurred to me, but I know not whether the observation will be found correct, that the intermittent of the comparatively dry Upper Provinces is not marked by such a prolonged shivering cold stage as we see in regular marshy countries. Indeed I have seen many cases of fever at this station with the intermissions as distinct and perfect as possible, yet where the next accession of fever has not been preceded by any cold stage; and this state of things I do not recollect having observed elsewhere. Perhaps it is also correct to state that where the cold stage is best marked, there is the least tendency of the disease to run into the remittent form. Dr. Dempster, of the Horse Artillery, has informed me, as already hinted at, of the vast amount of spleen disease which, in the course of his enquiries as a member of the Canal Committee, he discovered in the villages irrigated by the Delhi canal. This diseased state of the population we must assuredly take as a proof of the extreme prevalence of intermittent fever. It would in my opinion be an extremely interesting enquiry to go over the same ground, for the purpose of ascertaining by any possible means the co-existence at the same or at a different time of remittent fevers also. So would it also to my mind be most interesting to apply the spleen test of Dr. Dempster to the localities where I have described the prevalence of such deadly remittents.

General remarks upon by the author.

Great prevalence of in irrigated districts. Observations of Dr. Dempster. Inferences therefrom.

We are taught to believe that it is temperature which changes a prevailing fever from a remittent to an intermittent character. It is certainly not temperature alone which makes the change, for I have shewn the prevalence of a deadly remittent in the cold months, and I learn from Dr. Dempster that the victims of spleen in the localities indicated described their fevers as occurring in the rains and drying-up months—"we made particular enquiries as to the season of the year when sickness prevailed in the irrigated districts. Every where the people concur in stating that it is during and immediately after the rains that they suffer from fever. They appear to be comparatively healthy at all other seasons."* It may be objected that I am not able always to draw the line between remittent and an intermittent fever—possibly not—but I am inclined to think that this spleen enlargement is of itself a pretty distinguishing test, and that it is a sequela of intermittent much oftener than of remittent fever. A consideration of the causes producing the amount of spleen disease, noticed by Dr. Dempster, and of the history of the remittents which I have given, perhaps warrants the conclusion that a high degree of moisture is favorable to the production of intermittent, while remittent again presents itself under circumstances where the quantity of moisture in the soil and atmosphere is less. The general law of a high range of temperature favoring the appearance of the remittent, in preference to the intermittent form of fever, must I believe be admitted with exceptions. "In the higher grounds of the West Indies," writes Dr. Watson in his lectures, "agues occur as in this country. As you descend, and the mean atmospheric temperature increases, remittents are met with. and in the lowest and hottest parts the fever becomes continued." I will venture to observe in conclusion that intermittent fever prevails all over the valley of the Ganges to a greater or less

Effect of temperature on the type of fever.

Inferences drawn from the remarks offered.

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* The general health described by Dr. Dempster to be enjoyed by the victims of spleen in the localities he visited appears to me remarkable, as in other situations a state of general cachexy is the usual accompaniment of spleen disease.

extent at all seasons of the year, wherever its producing causes are existent; and that, as far as my observation goes, it is by far less prevalent in the cold weather than at any other time.

### EPIDEMIC EXANTHEMATA.

Character of their epidemics in this climate.

In next proceeding to notice the character of the exanthemata in this climate, I premise what I have to write by expressing how little there is to say on the subject. This would seem to be owing to the comparative mildness of the eruptive diseases—variola being excepted. Their invasions among the people therefore attract little of our notice, and their character, as modified by this climate, and their history, is accordingly imperfect.

Variola.

Its prevalence partly dependent on inoculation.

Variola we are but too well acquainted with, and there are points of its history in this climate highly worthy of our consideration. The disease makes its appearance every hot season, and in some years is peculiarly prevalent and severe. Inoculation being so common a practice, it becomes a difficult matter to say when the appearance of small pox depends upon artificial means, or upon natural causes. So also it is difficult, when the disease is unusually prevalent, to say whether that may not depend upon the activity of the inoculators. An increased mortality may lead us to the conclusion that the state of the atmosphere favors the spread of the disease, as we know the comparative mildness of inoculated cases;* and the fact of more Europeans than common being seized may safely lead us to the same conclusion.

Variola and vaccinia both influenced by season.

But in the north west and Behar not quite in the same man-

The natives seem to be aware that the setting in of the hot months is the epidemic season for small pox. for it is then they commence their operations; nor is it less worthy of remark that it is then too we find the vaccine disease runs its course most favorably. In fact, though Dr. Stewart has stated that cold and

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[*] I find that the natives of this part of the country entertain the belief that small pox from inoculation is not infectious. I recollect once seeing a similar opinion expressed in an American journal.

dryness favor the action of both poisons on the human body, it is not till the heat begins to increase that we find the vaccine take best in this part of the country; nor is it till then that the native inoculators appear to anticipate success.* Dr. Stewart's observation is no doubt correct where he made it. The effect of climate on these poisons is very curious and interesting, for though it is quite true, as noticed by Dr. Stewart, that the hot and moist weather of the rains checks the spread of variola and the success of vaccination in our climate, it would seem that in other countries it is exactly the reverse of this. "Dr. Copland states on the other hand that in the hot, moist and sultry weather following the rainy season on the African coast the variolous poison acquires an extraordinary power of development, and is extensively diffused and fatal."—*Forbes' Quarterly, No.* 46.

ner, as mentioned by Dr. Stewart to be the case in Calcutta.

Laws of these poisons differ in different climates.

I am not able to offer any detailed history of small pox epidemics in this country. I know from my own observation that it has occasionally shewn itself in an epidemic form during the cold months, but I adhere to my former assertion that it is on the advent of the hot weather it usually commences in Behar and the Upper Provinces, and then too have I witnessed its most severe visitations.

Variola most prevalent at the setting in of the hot season.

The report on small pox in Calcutta, and on vaccination in Bengal, by Dr. Duncan Stewart, and published by order of Government, is a highly interesting document; and if equally accurate information could be obtained from the interior, we need not doubt that the necessity of altering the circumstances of the people in respect to this fearful scourge would force itself on the consideration of Govern-

Dr. Stewart's report.

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* It has been observed that under certain circumstances small pox cannot be inoculated.—*(Forbes' Quarterly.)*

In a foot note there is a curious account of the effect of the Hurmattan in preventing inoculation from producing small pox—"the Hurmattan is an extremely dry but not a hot wind; about 70 were inoculated a day or two after the Hurmattan set in, but not one had either sickness or eruption."

Unfortunate position of the natives of India with respect to variola and its prophylactic.

Causes which affect the success of vaccination.

Limited means; liability of the virus to degenerate; and prejudices of the people.

ment. The inhabitants of no country can be more unfortunately situated than are the natives of Hindoostan at the present time with respect to small pox. The limited amount of the means for diffusing vaccination—the spurious nature of the disease at certain seasons, and the prejudices of the people, are the causes which prevent this great and undoubted prophylactic (speaking generally) from doing much good; and this is the reason why in another part of this work I have hinted at the propriety of substituting a system of inoculation.* I would here examine the question more deliberately.

Present system utterly defective.

An extended one not encouraged by the success of the present one.

Uncertainty in producing the disease.

Suggestion only to vaccinate at the favorable season.

The present system only affords the opportunity of vaccination to the European and native population at the civil and military stations.† Lord William Bentinck might well call this a shower falling in the sea; and it seems unnecessary to point out that until a larger scheme, that would give the people the opportunity of protecting themselves, is adopted, we have not done much. It is true that the result of the experiment on the present field of operations is not very encouraging, but I believe that an improved system would shew a different result, and such a one as would perhaps induce the Government to extend the benefits of this great boon to humanity in other countries, to the interior of districts. It seems now fully acknowledged that the success in producing a good vaccine vesicle is very uncertain in most parts of the country, except during a few months of each year—against this acknowledged fact, if we persevere in trying to persuade the people to submit to an operation which will generally fail, and when it partially succeeds is not protective, we cannot hope to convince them that we are offering them a prophylactic which will secure them from the attacks of small pox. Vaccination should not be attempted but at seasons when it is known to succeed, and I can have no doubt that the occasional introduction of fresh lymph from colder climates is judicious and advisable. I have often had occasion to notice the great proclivity of hill people to small pox infection, and the greater severity with which the disease attacks them. May we not suppose that the vaccine will be a stronger disease in them, and that we might in this manner secure an abundant supply of it. The quickness, however, of steam communication supersedes this necessity. I am disposed to concur entirely in opinion with Dr. Duncan Stewart, that the separation of vaccination from other professional duties has greatly retarded its spread, and that the institution of dispensaries might have been made, and may be made yet, a most powerful instrument for its propagation.* It is usual to speak of the prejudices of the people against vaccination as a thing which is insurmountable, and which must ever interfere with its full introduction; but let us remember that the prejudice has yielded whenever and wherever it has been opposed by zeal, perseverance and judgment; and that a few years ago we might have applied the same argument against the probable success of dispensaries, while at the present time thousands of the people flock to them for relief.† We are too apt to act hastily against the reluctance the natives feel in adopting our suggestions and customs. In fact there is a little prejudice on both sides, however unwilling we may be to acknowledge it. But even if it were possible (as I think it is) to insure a successful diffusion of vaccine at the civil and military stations—1st, by obtaining fresh supplies of lymph, and only

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* In reading Dr. Stewart's report one is struck forcibly by the frequency of modified small pox after seemingly successful vaccination, a fact seeming to prove that the lymph degenerates.

† In Calcutta for twelve years there has been one death per annum for every 458 living; 468 individuals out of a population of 158,000 die annually.

And to procure the disease off hill people.

Dr. Stewart's suggestion to spread vaccination by means of the dispensaries highly approved of.

Author's opinion that the prejudices of the people may be overcome.

Success of dispensaries adduced as proof of this.

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* We have a very interesting numerical statement in proof of this given by Dr. Stewart. From 1835 to 1840 the number vaccinated in Calcutta rose from 920 to 6546.

† I learn from a letter from Mr. Clarke, the Magistrate of Bareilly, published in Dr. Stewart's report, that in the town of Bareilly alone in one year 12,000 persons received relief at the Government dispensary. I may refer to the public reports for ample proof of the demand for relief at these noble institutions. Their establishment was publicly advocated by me years before they were founded.

Means likely to improve the present system.

But even if successful, the bulk of the people are still unprotected.

Justifying the suggestion to substitute a system of inoculation.

attempting to vaccinate at the proper season—2nd, by applying the means available in the dispensaries that have been and are to be established—3rd, by impressing anew upon the civil surgeons the importance of strenuous and zealous exertion in this branch of their duty—4th, by securing the co-operation of the military surgeons in their own particular field. If, I say, we had done all this, what have we done yet towards the general spread of vaccination among the people? Nothing, absolutely nothing; and it is this consideration which justifies us in alluding to inoculation as a means of lowering the present rate of mortality, and dealing with the question whether inoculation should be legalized and enforced, or be put a stop to altogether.

Effects of the present practice of inoculation.

The questions of suppressing it, or of introducing compulsory inoculation.

Most of my readers must be aware that the practice of inoculation prevails extensively in all parts of the country; that in this way the disease is widely diffused; and, though those who are inoculated have a mild disease* in comparison, the general mortality is greatly increased by it, as was clearly proved in England by numerical statements. The practice in England is now forbidden; but whether here (where we have not the substitute to offer) we could in justice suppress it, and thus deprive the individual of the power of protecting himself in the only way he can is a delicate question, and leads us next to consider whether a legalized system of inoculation might not be the best adapted for this country. To treat this great question at full length, involving the practicability of the measure, as well as its advantage, would occupy more time and space than I can at present devote. It does seem to me, however, on a hurried consideration of it, that we would here have the prejudices of the people co-operating with us; that we should be able to avoid the difficulties and uncertainty attending upon vaccination in India; that we have the establishment made to our hand in every town and village; and that it is perhaps possible to frame rules for inoculation, which would insure its universal adoption, and at the same time avoid the danger of spreading the disease by infection.* The following extracts from Dr. Stewart's report will shew that a proposal to offer a substitute for vaccination in this country is not a mere matter of idle speculation, but worthy of deep consideration, if not of ultimate adoption. Extract of a letter from the Bengal Medical Board to the Governor General of India—"as connected with this subject, we beg respectfully to refer to our dispatch to your Lordship's address (dated 3rd May 1841), when we expressed our sentiments fully regarding the impossibility of establishing the general use of vaccination among the natives of this part of India. In that letter we expressed our intention of calling upon the different Superintending Surgeons to report their sentiments on this important subject. These reports we have now the honor of forwarding, and your Lordship will perceive that with scarcely any exception all the Superintending Surgeons concur in the unfavorable opinion formerly come to by us with regard to the spread of vaccination. Dr. Stewart seems to think that it might be advantageously prosecuted in the large cities, as formerly attempted. Our own personal experience leads us to a different conclusion, and the only places where we would expect success are Calcutta and some of the hill provinces."

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* I state, on the authority of Dr. Watson, that about one in 500 die of those inoculated—see his lectures, page 732 and 3, vol. 2nd. In America it was calculated that one in 400 died. Of the natural disease about 1 in 5 are said to perish.

Proofs of the inefficiency of the present vaccine institutions.

Extract of a letter from Medical Board to Governor General.

The next extract contains the opinion of the Superintendent General of Vaccination, and on that account must carry great weight along with it—"being called on to submit any suggestions for the improvement of the department which occur to me, I am bound to declare—1st, it seems vain any longer attempting to keep up a vaccine establishment at the small zillah stations, as at present—2ndly, the only places where this should be done are I think the large towns, as was the case formerly;

Of one from Dr. Stewart to Medical Board.

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* I regret, however, says Dr. Cameron, late Superintendent, in a paper presented to the Medical and Physical Society of Calcutta in 1831, that these expectations have been very imperfectly realized, after an experience of 21 years.

but at these it seems to me desirable, in order to recommend vaccination to the natives, that the practice of it should be associated permanently with that of medicine."

Summary of present state of the question.

I have thus I believe shewn that at the present time the boon of vaccination is by no means available to the great bulk of the population, and that where institutions do exist the good they effect in the Bengal Presidencies is very trifling indeed. I have also endeavoured to point out that the natural obstacles to a wide spread diffusion of vaccination in this climate, though serious, are in some degree surmountable by suiting details to local circumstances; and I have suggested whether, with reference to all the bearings of the case, the substitution of inoculation would not be advisable.* It seems at any rate clear that the present state of things is greatly susceptible of improvement, not by a despairing view of the subject (as taken by the Board), or by a retrograde movement (as recommended by Dr. Stewart), but by an increased liberality on the part of Government, by a better application of the agency now disposable, and by accommodating our operations more to the peculiarities of our climate. It is ten years now since I publicly advocated the increase of European agency in the magisterial department, and above all the strengthening of the executive in the interior of districts; and at the same time I ventured to suggest the employment of the youths educated at the Medical College in the interior of districts.† The first measure has been adopted, and I will not despair of hearing of the second, if I do not not remain to see it. At no smaller cost could the Government confer a greater boon on the people.

And author's opinion of what ought to be done.

The great advantage pointed out of appointing Sub-Assistant Surgeons to the interior of districts.

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* I may here refer to the interesting experiments of Dr. Maxwell, of Dumfries, shewing that the virus of small pox produces a milder disease by keeping. In this climate perhaps that property would sooner be acquired.

† I do not of course pretend to say that my publicly urged suggestions led to the appointment of Deputy Magistrates. I may perhaps flatter myself that I forwarded the movement, and I have at any rate the satisfaction of having made an effort to obtain a great public object.

Great improvement in medical police, particularly as connected with the administration of justice, much alleviation and prevention of disease and misery, and the spread of vaccination in the interior of districts, are all benefits which would arise by adopting this recommendation. Besides the undoubted professional qualifications of these young men, their knowledge of the language, habits and prejudices of the people, eminently qualify them for such employment. To a certain extent indeed they would become instruments of civilization. I do not agree in the opinion that it would be well to break up the establishments at the small civil stations; but I believe that the present system requires change,—the association of vaccination with the other branches of medical charity—the support and co-operation of the civil authorities,—and above all the timely visits of the vaccinators into the interior seem advisable, and we have proof in Dr. Stewart's report that by such means, as practised at Madras and Bombay, the real or supposed prejudices of the people can be overcome. What is to my mind the great difficulty in this question remains to be noticed: the uncertainty of succeeding in producing a good vaccine vesicle. I feel persuaded from personal observation that it would be well to confine our operations to particular seasons of the year, (and these would differ in different parts of the country) and to depend for our original supply, when required, upon Europe or the hill stations.

Means of improving the present system at civil stations.

Great difficulty in regard to the uncertainty of the virus; suggestion on this head.

During my period of service I have devoted from time to time some attention to the subject of eruptive disease among horned cattle. It is a well known fact that a disease, called *gohtee* or *mahta* by the natives, rages destructively among cows

Eruptive diseases among horned cattle.

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Extract of a report from Superintending Surgeon Tweedie—"a marked difference was, however, observable in those who were born in India from such as had only left England in their youth, and had been vaccinated at home. In the latter the general character of the disease was that of modified small pox, although cases of the confluent kind were not unknown among them; whereas all the fatal cases were among those who, though of European parents, were born and vaccinated in India, except one.

and bullocks over most parts of the country. I am not aware that this murrain is always attended with a pustular eruption, but that it is so sometimes I am quite sure. I am also able to state from personal knowledge that sheep, goats, and even the domestic fowl, sometimes die from a similar affection.* Further investigation is highly necessary and desirable, to ascertain whether a milder phase or a different disease does not occasionally exist in this country, which might be identified with the cow pox as known in England. Even there it would seem to be a rare disease, and my own belief is, from what I have seen and heard, that the true vaccinia is at times present on the udder of cows.† I have read somewhere of the existence of the same virus on the udder of camels in Scinde, ensuring to the milkers an immunity from small pox ; and I have myself seen a vesicle on the teat of a goat so marked and vaccine-like, that I introduced the matter into the arm of three native children. On one a beautiful vesicle resulted, but on the next trial the chain was broken. I have seen varicella occasionally. The natives look upon it as a distinct disease from small pox. If they are wrong, their mistake need not surprise us, since the question is not yet settled in the universities.

### MEASLES.

During a residence of twenty one years in India, most of it passed in Behar, I believe I may say that I only once saw measles till I came to this station in 1845. It has prevailed here as an epidemic during each hot season, not vicarious with small pox, but often at the same time prevalent. At the very time I am writing two European soldiers of the 1st Bengal Fusiliers are in hospital with a severe form of rubeola, rendering free depletion, as I understand, necessary; and I have also heard of small pox having commenced. The disease appears occasionally in Calcutta, but is much more severe and frequent in the North West Provinces, marking as it were a departure from the tropical climate, and a gradual approach to the climate and diseases of more temperate latitudes. But, as if to induce me to remark that all general rules and observations must be laid down and taken with a qualification, I am reminded of the very singular epidemic fever noticed by the late Dr. John Adam as prevailing among European children in Calcutta in the rains of 1828, and marked in that climate, usually so free from and so favorable to chest affections, by violent symptoms of bronchitic inflammation often proving fatal. I have seen this affection often in a sporadic form at the time when changes of season and temperature are most rapid, and particularly when accompanied by strong winds; but it was not confined, as in the instance noticed by Dr. Adam, to children, but prevailed among all classes, and might often be called influenza, from the manner and extent of its invasion, and from the character of the symptoms.* If we are to identify this catarrhal epidemic with the influenza of European countries, we may perhaps account for its not often proving fatal by the age of the Europeans resident in this country. How much light will be thrown on the subject of Indian diseases, when the field for observing disease among natives becomes widened, and when we can bring our observations to the test of numerical certainty. To return to the notice of the epidemic described by Dr. Adam, I will prove the peculiarity of its cha-

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* I may refer to the experiments of Mr. Macpherson as confirming my opinion. My friend Mr. Furnell discovered by painful experience that an eruption on the cow may at first produce a disease like vaccine, which may afterwards become variolous and fatal.—See vol. 6, page 687, of the India Journal of Medical Science.

† It is a curious circumstance that Mr. Macpherson and Dr. Stewart should both have failed in infecting cows from the human subject, while Dr. Seely succeeded, and announced the discovery of cow pox and small pox being identical. It may be that from the prevalence of the natural disease in India they were experimenting on animals that had had it.

Mild character of in this climate.

Bronchitic epidemic among children noticed by the late Dr. John Adam.

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[*] I believe I am warranted in saying that cattarrh, whether sporadic or epidemic, is a far milder disease than in colder climates.

racter by quoting the words of the respected and talented John Adam himself*—"it is peculiar to the epidemic now described that it should occur as such in subjects of tender years, and be exclusively confined to them. In the history of Indian diseases so far as I am acquainted we have no precedent to compare with it." Mr. G. G. Macpherson, in a letter published by Dr. Adam, notices the prevalence and fatality of this epidemic among children over Bengal about the same period, and has the following observation on the state of weather prevailing at the time—"I am totally at a loss to assign any cause for the prevalence of this disease; there was, however, one thing remarkable in the weather, which I thing worthy of notice. The wind during the rainy months in Bengal blows almost invariably from the east or south east, but during August and September last year it was generally southerly or easterly, with hot sultry days and strong gales at night."

Hooping cough.

Hooping cough, or pertussis, is the next epidemic to mention; and it seems not a little remarkable that while we had to say of measles how much more it prevailed, and in how much more severe a form it presented itself in the Upper Provinces, it is not so with reference to hooping cough. The thing is more curious still when we notice the severity of the disease at the hill stations, where many deaths take place from it yearly among the European children. It prevails as an epidemic all over the plains of the Ganges, usually in a very mild form, and most commonly shewing itself at the same time of the year with the exanthemata so allied to it in many particulars.

This will conclude what I have to say of the epidemics of this climate, for with regard to dysentery what it bears of an epidemic character may be noticed in my 4th chapter.

It may be well, however, to offer a short summary of the facts which are most practical and important.

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* The spoiler came, and all his promise fair
Has sought the grave to sleep for ever there.

1st. Cholera morbus in our time first attracted notice on the outbreak of a severe epidemic in 1817, which was preceded by very unusual states of weather.*

2nd. Since that time it has been endemic in the plains of the Ganges, and has from time to time appeared in an epidemic form—some years in one part of the country, some years in another.

3rd. During the hot months, and after the rains, are the seasons when the epidemic usually appears; and it is generally, if not always, accompanied by unusual states of weather.

4th. The epidemic has been observed to invade from the eastward, in a westerly direction. (Perhaps dependent on the direction of electrical currents—see Prout's Bridgewater treatise, page 140.)

5th. The continued fevers of this climate are seldom, if ever, contagious, and are usually of a mild character, depending upon mere climatic vicissitudes.

6th. The exceptions are when the remittent, becoming severe, and even malignant, runs into a continued form, with filth and bad ventilation co-existent.

7th. It is in the North West Provinces that the exceptions noticed in the last paragraph have been observed to occur.

8th. The remittent fever dependent upon malaria prevails every year in the valley of the Ganges, and becomes extensively epidemic in seasons of great inundation or of excessive drought.

9th. Tracts of extensive jungle, like the Terai and the lower hills, localities intersected by ravines, and the prevalence of the black cotton soil as in Bundelkund, are remarkable for generating the cause of fever, or for producing it in a severe form in those who affect such localities.

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* But though modern writers have only noticed cholera since 1817, there are clear historical records of its former prevalence, not to press here my own belief that it is described by Areteus Celsus and Sydenham.

10th. Intermittents prevail at all seasons. How far they depend upon an identical cause with remittent, or why, if so, one person should have intermittent, and another remittent, fever, does not seem fully understood.

11th. Very moist or really marshy ground appears to me that which most usually causes a real ague fit—drier soils giving rise to remittents, or intermittents without the marked cold stage.

12th. Local causes, such as stagnant water, filthy accumulations and bad ventilation, act perniciously. Good drainage, cleanliness and free ventilation, will always mitigate and sometimes prevent the outbreak of epidemic fevers.

13th. Small pox appears not to be mitigated much, if at all, by the heat of this climate, and in fact the advent of the hot weather appears always to favor its appearance.

14th. The prophylactic efficacy of vaccine is greatly lessened in this climate by reason of a total want of success in producing the disease at some seasons, and great uncertainty at all times.

15th. Measles is a mild disease in all parts of the country as compared with its epidemic character in Europe, but it is more severe in the North West Provinces than in Bengal and Behar. Hooping cough is a mild disease all over the plains of the Ganges.

## NOTE TO CHAPTER SECOND.

In the foregoing chapter I have alluded to the difficulty of explaining how the heat of the human body remains the same in all climates, and I have remarked upon the different effects of dry and moist heat. The following extract bears upon the points in question—" the sources of animal heat have not yet been demonstrably ascertained ; but that it is constantly generated and constantly expended has been long known ; and if any considerable disproportion occurs between these processes, it is at the immediate risk of health. During repose or passive exercise (such as riding in a carriage, or sailing) the surplus heat is readily carried off by the insensible perspiration from the lungs and skin, and by the contact of the colder air; but when the amount of heat generated is increased, as during active exercise, an increased expenditure becomes immediately necessary—this is effected by the skin and lungs being excited to higher action, by the latter sending out the respired air saturated, and loaded with vapour, and the former exhaling its fluid so rapidly as to form a sweat. Accordingly we find that in cold countries and in frosty weather the exhalation from the skin is reduced to a very moderate amount, the superabundant heat being rapidly carried off by contact with a cooler air; and that in warm climates, where the heat is not carried off in this way, the surface is constantly bedewed with perspiration, and a corresponding appetite exists for liquids, by which the perspiration may be kept up to a sufficient degree. Every one must have experienced the grateful effects of this provision in passing from the dry restless and burning heat like that of fever to the soft and pleasant coolness which follows the breaking out of the sweat. Attention to the order of events affords the requisite knowledge of the means employed for carrying off the increased heat which is produced when a person is exposed to a warm air and powerful sun, or engaged in severe exercise. At first the body is actually felt to be warmer, the skin becomes dry and hot, and the unpleasant sensation of heat is soon at its maximum. By and bye a slight moisture is perceived on the surface, followed by an immediate increase of comfort. In a short time afterwards this moisture passes into free and copious perspiration, and if the heat or exertion be still kept up, the sweat becomes profuse and drops from the body or wets the clothes which envelope it. A decrease of animal heat unavoidably accompanies this, because, independently of any vital action contributing to this effect, as is most probable, the mere physical evaporation of so much fluid is itself sufficient to carry off a large quantity of caloric. The curious experiments of Edwards tend to shew that evaporation is really the only means required for reducing animal heat to its proper degree; but the results obtained by him require to be confirmed, and the experiments varied and carried further before the inquiry can be considered as completed. The sagacity of Franklin led him to the first discovery of the use of perspiration in reducing the heat of the body, and to point out the analogy subsisting between this process and that of the evaporation of water from a rough porous substance, so constantly resorted to in the East and West Indies and other warm countries as an efficacious means of reducing the temperature of the air in rooms, and of wine and other drinks much below that of the surrounding atmosphere. The quantity of fluid evaporated from the skin during profuse sweat so far exceeds that given out during the highest insensible perspiration, that two pounds in weight have been lost by this means in a couple of hours, an amount evidently sufficient to carry off the largest quantity of superfluous animal heat which can ever be present. In the performance of this function the skin is indeed assisted by the exhalation from the lungs, but, as both act on the same principle, the explanation is not affected by this circumstance.

In very warm weather the dog is always seen with the tongue lolling out of his mouth, and copiously covered with frothy secretion; this is merely another modification of the means used for reducing animal heat. The dog perspires very little from its skin, and the copious exhalation from the mouth is the expedient resorted to by nature for supplying its place.

" Bearingin mind the preceding explanation of the functions of the skin, the reader will peruse with interest the following remarks from Dr. Thomson's work formerly quoted—" Dr. Davy, in his travels in Ceylon, states, from his personal observation, that on first landing in a tropical climate the standard heat of the body of an European is raised two or three degrees, and febrile symptoms occur, which require temperance, the avoiding every cause of excitement of the vascular system, and the use of aperient medicines. All authors, and indeed every observing person who has visited the torrid zone, agree that with the languor and exhaustion resulting from the high temperature of the atmosphere, there is a greatly increased mobility of the nervous system. *The action of the cutaneous vessels amounts to disease*, and produces that eczematous or vesicular eruption of the skin known by the name of prickly heat, which occurs in Europeans who visit the West Indies, on their first landing. On the other hand, this function of the skin is so much weakened, almost paralysed, when the climate from which a person is passing is dry and bracing and that from which he has passed is humid and relaxing, that congestions of blood take place in the larger vessels, the body becomes susceptible of the least impression of marshy exhalations, and agues and similar diseases are produced."

We shall now be able to understand why in summer we suffer most from heat in what is called moist close weather, when no air is stirring; and why warm climates that are at the same time moist are proverbially the most unwholesome. The chief reason is the diminished evaporation from the skin, which such a condition of the atmosphere produces, partially shutting up the natural outlet of the superfluous heat of the body; and as it at the same time checks the exit of the waste matter which ought to be thrown out, and which is known to be as injurious to the system as an active poison taken into the body from without, the hurtful consequences of such weather and climate, and the fevers, dysenteries and colds to which they give rise, are partly accounted for.

A moist state of the atmosphere is also favorable to *absorption*, and hence, if noxious effluvia are at the time floating in the air, they are more easily received into the system. It is on this account that night air is so unwholesome, particularly in malaria districts, which are loaded with moisture and miasma, or marsh poison; for when the air is dry as well as hot, free evaporation takes place, and absorption is almost null, so that little or no inconvenience is felt, and health often remains uninjured. Delaroche has established this point conclusively by experiment. He exposed animals to a very high temperature in a dry air, and found them to sustain no mischief, but when he exposed them in an atmosphere saturated with moisture, to a heat only a few degrees above that of their own bodies, and greatly lower than in the former instance, they very soon died. Here also we see the reason why in ague and other fevers the suffering, restlessness and excitement of the hot stage can never be abated till the sweat begins to flow, after which they rapidly subside; and why the remedies which, when given in the hot stage, added to the excitement and distress, may now be productive of the best effects.—*Dr. Andrew Combe.*

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### NOTE SECOND TO CHAPTER SECOND.

Acknowledging the difficulty of the question how changes of weather influence the human organism, and so produce disease, I am impressed with the belief that the subject is highly worthy of further investigation; perhaps we have not yet paid sufficient attention to minute changes, and it may be that there are changes which are important, though our instruments now in use are not sufficiently nice to acknowledge them. The difference in the salubrity and temperature of places lying in the close vicinity of each other, is not explainable altogether by the general laws we apply to account for the amount of heat and the other elements of climate. The following extract will be found to have some reference to the above remarks:

"Before we quit this subject, we may remark that Mr. Daniel traces to these great currents the fluctuations of the barometer, and all the innumerable modifications peculiar to different localities of sea and land, of mountain and plain. For, as he justly observes, in the nicely balanced state of the forces producing these currents, slight irregularities of temperature are capable of causing great disturbances; and expansions and contractions acting unequally upon the antagonist currents operate by deranging the adjustment of their several velocities.

Hence accumulations in some parts, and corresponding deficiences in others, necessarily arise and occasion fluctuations in the barometer far surpassing what would be occasioned by the whole vapour, supposing it were at once added or annihilated. At the same time these irregular distributions, in seeking to regain the proper level, and in struggling to restore the equilibrium, produce temporary and variable winds, which modify the regular currents, and often reverse their courses, particularly in the temperate regions, where, as formerly mentioned, the alternations of temperature and the fluctuation of the barometer are the most remarkable."—*Prout's Bridgewater Treatise.*

## NOTE THIRD TO CHAPTER SECOND.

The following extract has reference to the state of the atmosphere during the prevalence of cholera. "As an instance of the presence of such bodies in the atmosphere we may mention a very remarakable observation which occurred to the writer of this treatise during the late prevalence of epidemic cholera. He had for some years been occupied in investigations regarding the atmosphere, and for more than six weeks previously to the appearance of cholera in London, had almost every day been engaged in endeavouring to determine, with the utmost possible accuracy, the weight of a given quantity of air, under precisely the same circumstances of temperature and of pressure. On a particular day, the 9th of February 1832, the weight of the air suddenly appeared to rise above the usual standard. As the rise was at the time supposed to be the result of some accidental error, or of some derangement in the apparatus employed, in order to discover its cause the succeeding observations were made with the most rigid scrutiny. But no error or derangement whatever could be detected. On the days immediately following, the weight of the air still continued above the standard, though not quite so high as on the 9th February, when the change was first noticed. The air retained its augmented weight during the whole time these experiments were carried on, namely, about six weeks longer. The increase of the weight of the air observed in these experiments was small, but still decided and real. The method of conducting the experiments was such as not to allow of an error, at least to an amount so great as the additional weight, without the cause of that error having become apparent. There seems, therefore, to be only one mode of rationally explaining this increased weight of the air at London in February 1832; which is, by admitting the diffusion of some gaseous body through the air of this city, considerably heavier than the air it displaced. About the 9th of February the wind in London, which had previously been west, veered round to the east, and remained pretty steadily in that quarter till the end of the month. Now, precisely on the change of the wind the first cases of epidemic cholera were reported in London; and from that time the disease continued to spread. That the epidemic cholera was the effect of the peculiar condition of the atmosphere, is more perhaps than can be safely maintained; but reasons, which have been advanced elsewhere, lead the writer of this treatise to believe that the virulent disease, termed cholera, was owing to the same matter that produced the additional weight of the air. The statement of these reasons here would be quite out of place; it is enough to say that they are principally founded on remarkable changes in certain secretions of the human body, which, during the prevalence of the epidemic, were observed to be almost universal, and that analogous changes have been observed in the same secretions of those who have been much exposed to what has been termed malaria. The foreign body, therefore, that was diffused through the atmosphere of London in February 1832, was probably a variety of malaria, a subject which we now proceed to consider."—*Prout.*

# CHAPTER III.

## HYGEINE.

" *Daughter of Pæon, queen of every joy, Hygeia !*"—ARMSTRONG.

The art of preserving health yields to no branch of medicine in importance. Publicly speaking, it involves much of the happiness of communities, the efficient performance of public duties, and at times the safety of Government: for on the health of its armies is a government at times dependent; equally required to repel foreign invasion, as to suppress internal disturbance.

Importance.

Privately speaking again, what can be more important to the individual ? His comfort, his position in society, his social happiness, his very life may depend upon it.

As disease in this country is known to depend upon extreme heat of the atmosphere, its saturation with moisture or more noxious vapours, bad ventilation, sudden changes of temperature, and all such things as enhance the effect of the above causes; so does hygeine consist in such measures as will go to mitigate, modify or prevent their effects.

Objects of hygeine.

I shall include what I have to say on the subject of hygeine under the following heads: 1st, locality; 2nd, accommodation; 3rd, exposure and exercise; 4th, diet, clothing and personal habits; 5th, mental government; 6th, profession. I hope to offer a fair and unbiassed judgment on these questions, not forgetting the old familiar saw, that " what is one man's meat is another man's poison," nor my own motto, " ibis tutissimus medio."

Division of subject.

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## SECTION I.

### LOCALITY.

Sites for buildings.

There is nothing of greater consequence in this climate than the site of public or private buildings: in a tolerably healthy part of the country a bad selection may give all the effect of a bad climate, whereas choice and care in selection may obviate much mischief, even in the worst situations. The chief points deserving of consideration are the elevation of the ground, a free ventilation by exposure to the prevailing winds, a dry soil (sandy if possible), and the absence of stagnant water and all other impurities. Large, umbrageous trees are upon the whole salubrious, unless too near, because they prevent the soil from getting heated, have a direct cooling effect by evaporation, and it is known that malaria attaches itself to their leaves; but low brushwood or rank vegetation are injurious. Where lakes or jheels exist, it will always be advisable to build away from them, or at any rate to avoid the winds blowing off them.* The banks of rivers where high are excellent sites for building, because we have the benefit of the cool fresh breeze, and are usually free from all stagnant water. At this station fevers are said to prevail most on the banks of the river, but (even if this be true, and I have not satisfied myself on the point) it may be owing to the banks sloping low, as they do in many places, to the numerous ravines that fall into the river near many of the houses, which ravines drain off from the large bazars; or it may be owing to the number of sand banks on which vegetation is encouraged. That the neighbourhood of ravines is unhealthy I am fully persuaded.

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* I have lately had the pleasure of reading the notes of the late Dr. W. F. Fergusson. All he has written appears to me most admirable: his reasoning is always close, and often unanswerable. He notices the attachment of malaria to ravines and dry water-courses.

It is well established that malaria travels with the wind, but not to great distances. Water and umbrageous trees are known to stop its course.

Sites of native towns and villages.

We can estimate the advantage of attending to choice of locality, by observing the dreadful effects on the health of the natives from the crowded, filthy, ill-chosen sites and ill-ventilated state of their bazars and villages. While Europeans continue healthy and free from any epidemics, they often suffer dreadfully from variola, fevers, cholera and dysentery ; not only are they oftener attacked, but their attacks are of a worse character, and this too is owing to bad locality. The atmosphere is stagnant and vitiated. *Free ventilations are the lungs—good drains are the bowels—and cleanliness is the skin*—of bazars, villages and all localities.

Change of air.

Under this head of locality I purpose noticing the subject of change of air. This seems to act beneficially in several ways, and I doubt whether we yet fully understand its whole manner of acting. It is usually accompanied by the pleasing novelty of change of scene, the new anxieties of travelling, and a relief from the toils and routine of our usual pursuits and occupations, which during sickness become exceedingly irksome. But there must be more than all this to account for the sudden change produced in many cases. In a fever, for instance, where a few miles will stop the paroxysms, and in young children where the effect on the mind is absent. It is probably the effect of novel impressions on the extreme ramifications of the nerves and blood vessels.* To the above observations we must add that, when the change is to a better climate, the reason for improvement is obvious enough ; but here a good deal depends on the nature of the disease. I am disposed to give the hill stations more credit than some writers have given in the cure of disease. To brace a constitution lowered in its tone by too long residence on the plains they are undoubtedly most beneficial, but I think they do more than this. The derangements of

Good effects of.

Supposed causes.

Hill stations.

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* In Professor Alison's Physiology, pages 374 and 375, will be found a very interesting description of the effect of pleasing emotions upon the capillary circulation and secretions. No doubt it is partly in this way that change of air and scene, and the excitement of travelling, act beneficially.

the liver and bowels that are marked by impaired appetite, vitiated secretions, constipated or too relaxed bowels, they usually benefit, or completely cure. None who are subject to relapses of fever, old organic affections of the liver, or dysentery, should go to the hills, when a sea voyage can be chosen. In chest affections much will depend upon the nature of the ailment, and its past history.* The hills are usually resorted to only during the hot months and rains. I am persuaded that the cold season would in many cases be the time for deriving full benefit from them.† Not long ago some discussion appeared in the newspapers on the cause of the increase of fever at the station of Simlah. The fact seems undoubted. I suppose they were Doctors who discussed the question, for they differed, as Doctors are said to do. One party if I recollect attributed the increase to the cutting down of trees, another as positively to the increase of vegetation. I incline to the former opinion, because I believe the miasm must come in the currents of air from the deep vallies. In another point of view the mountain ranges bordering on the plains of India present us with a subject of the very highest interest, politically, morally and humanely speaking. I allude to the location of the British troops in the hills‡. Already has a movement been made in the proper direction, and perhaps we have no right to expect, considering the expense of erecting new barracks and abandoning old ones, that the movement should be more rapid ; but when we consider the ultimate saving to the state, from diminished mortality, and the growth of an Anglo-Indian race to recruit the ranks, and the improvement of the soldier's habits, which will be the undoubted effect of out-door exercise and recreation, we need not doubt that in the progress of time, and after the completion of rail-roads in India, all the European troops will be cantoned in the hills during the hot months and rains. Even in England, where Indian questions are understood but slowly and by glimpses, this one has already excited attention. The Secretary at War has lately alluded to it in parliament as one of the improvements about to be effected in the economy of the British Army.

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* I am sure that this point requires further investigation, and strongly inclined to think that the hill climates will not be found so injurious in chest cases as is at present supposed.

† In many cases it would no doubt be advisable for the invalid to avoid exposure, by living in-doors for some time after reaching the hills. The changes of temperature are at times very sudden, and peculiarly trying for one just gone up from the plains. In hooping cough, a disease which appears to be fatal to children in the hills, a removal to the plains would often be advisable.

‡ Dr. Fergusson states that if the suggestions of Dr. R. Jackson, to canton the troops in the West Indies on the mountain ranges, had been adopted, when made, the lives of 12,000 soldiers might have been saved.

## SECTION II.

### ACCOMMODATION.

Kinds of building most advisable.

To moderate heat, and to have a free and unobstructed ventilation of pure fresh air, are the points to be considered in public or private accommodation. High-roofed buildings, especially when thatched, having ventilators, and surrounded by large verandahs, with wide lofty doors and glazed windows, will give the necessary coolness, if the cardinal point be not omitted of having the full sweep of the prevailing winds. It is astonishing how often this essential to coolness is overlooked for the sake of appearance or other trivial circumstances, such as to face a river or a road. Houses should be well raised from the ground, especially in Bengal and Behar,* and verandahs should be especially wide and protecting on that part of a house which is struck by the noon-day and evening sun. Early of a morning and late in the afternoon all doors should be thrown open for a space of time sufficient to purify the in-door air.* It is a question how much light ought to be excluded from our houses. Certainly the more it is excluded the lower the temperature, but it is an established fact that light is essential to healthy vital action, and I can have no doubt that too much exclusion of it may be injurious.† Night exposure to the east wind is considered dangerous in the lower provinces at all seasons, and in the upper provinces during the rainy months. The great thing is to avoid too confined an atmosphere, or the sudden exposure to blasts of air when the body is heated. When I came to India twenty years ago, to sleep under a punkah in the part of the country I lived in was a thing unknown. It is now almost the universal practice, and I can have no doubt greatly contributes to health, as it assuredly does to comfort. With children especially, whose delicate organization is so sensitive to outward impressions, the punkah is a great desideratum. Cleanliness in and about houses is of the greatest consequence in this climate. All vegetation that obstructs ventilation is objectionable: shrubs, and even flowers should neither be abundant or close by; drains should be kept particularly clean, or will themselves become vicious; and all decaying vegetable matter ought to be removed. I believe I have mentioned in a general or particular way all that is essential for healthy accommodation. The subject is one of much importance, to which very little is usually attached by Europeans in India. I am quite sure many people lose their health by living in bad houses, and by neglecting some of the other points I have mentioned; coolness, dryness, free ventilation, cleanliness, and the absence of vegetation are the chief desiderata. It is deserving the consideration of civil functionaries entrusted with the duties of conservatism, how generally all circumstances of locality and accommodation are disregarded under their jurisdictions, although, by judicious and cautiously introduced police regulations, much good might be done by widening streets, filling up dirty, stagnant pools; clearing away jungle, and removing all sorts of impurities, &c. &c. But it is more extraordinary still to find a place like this large military station,* inhabited by a large body of officers and soldiers, with hardly one measure of common conservatism. I may refer to a document long since before the Government—the report of a special committee assembled in consequence of my representations on this subject to the Major General then commanding the station. Many sources of public nuisance, and probably of disease, were pointed out, but they are still unremoved. It can never be expected that the heads of a government can attend to details like this. The fault lies in not having it a defined duty of some officer in a cantonment to suggest measures conducive to the public health, and in not giving the power to those in local authority to act upon such suggestions.

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* In all malarious countries, says Dr. Fergusson, the inhabitants of ground-floors are uniformly affected in a greater proportion than those of the upper stories.

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* "During healthy respiration the atmospheric air that supplies the lungs is constantly changed: if this renewal of the air is not provided for, but the same air is breathed over again, the circumstances attending respiration are altered."—*Waguer's Physiology.*

† Since writing the above, I have perused a very interesting work by Dr. Moore, on the use of the body in relation to the mind, from which I make the following extract—" I believe there is in all places a marked difference in the healthiness of houses, according to their aspect with regard to the sun; and that those are decidedly the healthiest, cœteris paribus, in which all the rooms are during some part of the day fully exposed to the direct light.

Sanatory suggestions.

When I was Civil Surgeon of Tirhoot, and afterwards at Dinapore, I had ample opportunity of witnessing the bad effects of the accumulation of human beings in confined spaces. At the former place some of the wards of the jail fell into the river, and, pending the erection of a new one, the prisoners were crowded into the remaining accommodation. The consequences were most disastrous. A new jail was built, but only for four hundred prisoners, because it was in contemplation to remove many of the prisoners to a penitentiary at Patna. Thus about seven hundred men

Crowded jails in Tirhoot.

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* Cawnpore.

Crowded barracks at Dinapore.

Great result from good accommodation at Hong Kong.

were pent up in the accommodation intended for four hundred! Awful mortality was the consequence. I have lately seen a report by the Inspector of Prisons North West Provinces. He gives measurements to shew that the space allotted to each prisoner is dreadfully defective in all the jails. My observation at Dinapore was on the accommodation of the European regiment stationed there. The whole corps (men, women and children) lived in two ranges of building, and those extremely hot, confined and ill-ventilated. Need it be added that Dinapore shews a high bill of mortality.* The accommodation of the soldiery is generally defective in space, but the evils of accumulation have lately been much avoided. I am told that the barracks lately erected at Umballah stand in echelon, an excellent plan to insure free perflation. In the United Service Magazine for February 1847 there is a paper entitled "A sketch of Hong Kong," which most forcibly demonstrates the advantage and true economy of supplying troops with good accommodation. The author well remarks that "expense, and great expense, is often an essential part of true economy." The dreadful mortality among the troops of Hong Kong during the first years of its occupation must be known to every one. It stood thus—

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|---|---|
| 1842, | 19 per cent. |
| 1843, | 22 ditto. |
| 1844, | 13½ ditto. |
| 1845, | 8½ ditto. |
| 1846, | 2½ ditto. |

The topography of the island is in itself a very curious and interesting subject of speculation. This author shews that in 1845 the troops were better accommodated; and in 1846 they occupied barracks of which I give his description, hoping sincerely that the eye of Indian authority may rest upon it, however humble the page now conveying a truth so important to military efficiency and to humanity. "The buildings are each three stories high, and not a man is allowed to sleep on the lower floors, which are all, however, appropriated to useful purposes. Each story is surrounded by a spacious verandah enclosed with venetians, which admit of being opened and shut at pleasure. The rooms are lofty, and so perfect in the system of ventilation, that, notwithstanding the number of inmates, the range of the thermometer is lower than in any private residence in the Island."—*United Service Journal.*

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* While engaged in writing this, I have been informed that the 98th Regt. have lost sixty men in May 1847 at Dinapore, while there was not one death among the Artillery living within a few yards, but in better barracks. I believe we may say fifty of those deaths might have been avoided. Put the argument in money, and we have a loss of half a lac of rupees. Take it as a matter of humanity, fifty lives have been sacrificed.

## SECTION III.

### EXERCISE.

"Exercise strengthens the muscles, promotes the various secretions of the body, and invigorates the nervous system."—*Henderson's plain rules for preserving health.*

Conducive to health, but requiring caution.

Although exercise is undoubtedly conducive to health in this country, and no man can in fact be said to enjoy real health without it, yet caution must be observed as to kind and quantity; and in this respect too "what is one man's meat is another man's poison," so that each individual should be guided partly by his own experience. Though strong robust health is best insured by strong manly exercises, some risk accompanies: the sickly hothouse plant often lives longer than its co-species vegetating luxuriantly in the open air, because it is less exposed to many rude vicissitudes. Two great objects of exercise are to change the quality of air we breathe, and to increase its inspired quantity—add to these the increased action of the skin, and in the capillary circulation generally, and the pleasing influence on the

Effects of exercise.

mind of some kinds of exercise, and we have a short rationale of its mode of acting.* This measure of exercise will do well for the old Indian, who is somewhat like the hothouse plant mentioned above, especially if he be a liver by rule; but for the younger and more full-blooded and more free liver, I would say that even in the hot weather all exercise that falls short of absolute fatigue, and where there is no undue exposure, will tend to keep him in health.

To be regulated according to the degree of health.

The dress must be immediately changed after strong exercise. I will ask my reader, supposing him to be in good strong health, whether even in the hottest periods of the dry months and rains he has not felt himself wonderfully refreshed and invigorated by a morning or evening gallop on horseback, aye even one that bathes his clothes with perspiration. In the following extract perhaps we have the explanation—"exercise promotes perspiration, by which much of the acrimonious particles are carried off, thereby greatly relieving the system." One thousand parts of this complicated fluid, says Ancell, contains from five to twelve parts of solid residue.

Dress to be always changed after strong exercise.

Invigorating result of strong exercise.

The more people of weakly constitutions are in the open air without exposure the better; for these gentle horse exercise or long drives in a carriage morning and evening are most advisable. It is in the nature of children to take much exercise, and we should insure for them as free, cool and open spaces for its enjoyment as we can.

Exercise for the weakly, and for children.

Exposure out of doors during the day should be avoided by all who can do so during the hot seasons; nevertheless, when particular avocations render it imperative, it is extraordinary how much exposure the European can endure with impunity, if his head be well covered, and he is a moderate liver, and es-

Exposure.

To be avoided during hot seasons, but safe if the head be well covered, and stimulants avoided.

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* Mr. Edwards has advanced a curious theory on the ill effects of exercise in hot climates, namely, that by increasing the quantity of inspired air we increase the dose of malaria. I oppose to this the result of observation, and I might add that if we increase the quantity of bad air we increase that of good also, by which the power of resistance is strengthened.

pecially takes no stimulants previous to or during the exposure. The head dress should be light, at the same time that its materials are as non-conductive of heat as possible. In the cold weather nothing braces the health more than free exposure and strong exercise, but even then the head must be protected.*

Remarks on the head covering of soldiers.

It was Sir John Moore who remarked that the admirable discipline which prevailed in the Roman Legions would have kept them healthy in our tropical colonies. I think not, if they had been allowed to expose themselves with the same kind of covering to the head as our soldiers use. As long as this continues, much and fatal sickness must be the consequence; and how easily it might be avoided I have had ample experience of judging during my long residence in Tirhoot. As I have remarked above, if the head be well protected a great deal of exposure can be borne with impunity; and why should not a soldier off duty have his head properly guarded? His exercises should doubtless be taken of a morning and evening, but, as he will expose himself, I repeat that protecting his head would often, very often, protect him from sickness also. Even when coup de soleil or apoplexy are not the immediate consequences, the great derangement of the circulation in the head will cause other illnesses. If he be of dissipated habits, the head only requires more protection. The head dress might still have a military appearance, if that indeed be a consideration. The venerable Dr. Robert Jackson dwelt upon the want of exercise as one main source of sickness among soldiers in the West Indian colonies, and yet how often we hear commanding officers blamed for injuring the health of their men by morning and evening parades. Is this a popular prejudice grounded in error, or are parades really

Parades.

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* "You may tell the sportsman that wet feet or a wet skin need cause him no apprehension, so that he continues in active exercise and changes his clothes, and avoids all further application of cold as soon as his exercise ends."—*Watson's lectures.*

During the exhaustion following muscular exertion in hot weather, and while the surface is freely perspiring, cold in any amount is intensely and rapidly injurious.—*Dictionary of Clinical Medicine.*

hurtful ? I cannot pretend to write on this subject from any practical experience, but, judging from general principles, and from the opinion of others regarding the necessity of exercise to keep troops healthy, I cannot think that parades without exposure to the sun can be otherwise than useful to men in robust health, living high and passing a day of idleness in their barracks. No doubt parades are monotonous, and therefore irksome ; other kinds of exercise would be much better, such as the practice of different games and athletic exercises, which might well be made a part of military discipline, as it was in the days of Greece and Rome. Gymnasia in large open sheds would I think contribute greatly to the health of the soldiery. We must always recollect that in this climate we are deprived at most seasons of the year of that sort of exercise which all classes at home enjoy out of doors at all hours, in the pursuit of their avocations or amusements. This doubles the necessity for systematic exercise, especially I repeat with those who live freely. The necessity of a pretty free action of the muscles of respiration, to assist the action of the bowels, is fully established.

Athletic exercises—gymnasia.

" I close this section with the following quotation. In fact the most agreeable feeling which I experienced during the whole time was while resting after undergoing in the ascent of a hill a degree of exertion sufficient to accelerate the breathing, and bring out a considerable quantity of perspiration. A lightness and activity of mind, and freedom about the chest which I never felt to the same extent at any other time, followed such excursions, and made the fatigue comparatively light."

" The second stage of exercise, or that in which by its frequency, moderation and regularity, nutrition and vigour are preserved at their highest pitch, is of course to be aimed at."—*Dr. Andrew Combe.*

## SECTION IV.

### DIET, CLOTHING AND PERSONAL HABITS.

"On the contrary, observation would lead me to believe that what is usually termed good living, by which I would be understood to mean a moderate indulgence in the pleasures of the table, conduces both to the attainment of good health and to the prevention of disease."—*Dr. Clutterbuck.*

Diet.

When we are laying down practical rules, we ought I think to consider not only whether they are correct in themselves, but whether also they are likely to command attention. Thus, when the amiable and sagacious Twining tells the Indian resident that a slice of toast and an egg with a cup of tea should be his breakfast, bread and recent fruit or raisins with cold water his tiffin, and so on for dinner, we may enquire how many are likely to follow his advice. In fact, he himself expresses a doubt on this head—but I venture to go further than this, and to say that many men would lose their health by following this advice of living by rule, which and the long use of the same kind of food are both injurious; and many men to keep up the healthy action of their organs require a more generous diet than is above recommended. The quality of the chyle depends upon the quality of the food, the quality of the blood depends upon the quality of the chyle, and good blood is necessary for the organs to the proper performance of their various functions; nor must it be overlooked that it has been proved in various ways that sudden changes of diet are attended with risk. Sir James Annesley and Johnson lay down equally specific diets: breakfast, dinner and supper (tiffin I suppose being out of the pale) are laid before us in minute detail for all alike.* Let the practical observer bring to his

Remarks on the rules usually laid down.

Author's opinion.

Practical observations.

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* Sir Astley Cooper related the following anecdote of Abernethy: "He ordered his patients to eat three ounces three times a

Less food required in a hot climate, but not so much less as usually supposed.

Necessity for change of aliment, and for

mind what he sees going on around him,—men eating freely, and without much selection, and yet enjoying a full measure of health and longevity. He who lives too much by rules, who studies his diet, and watches its effects with anxiety, is not likely to be in health. Often perhaps he lives by rule from necessity;* but when he does so from choice, not from necessity, I believe he is too watchful and solicitous about himself to enjoy good health. Nature has made the stomach an organ that bears a great deal of ill-treatment with impunity, and dyspepsia is fortunately not a very killing disease. Let me not, however, be thought to advocate over repletion. I believe it is quite true that we ought to eat less in a hot climate than in a cold one; in fact nature shews it by lowering the appetite; but I do not think the difference is nearly so great as is usually imagined.† By reason of increased heat, a more hurried capillary circulation, and the greater action of the skin, the waste of the solids and fluids is more rapid. A man in good health will best keep so, even in India, by eating what will satisfy his natural appetite, and that without being over particular, especially without making a study of the quantity and quality. By reducing the diet too much I have myself known several people injure their own health. It has too been established beyond dispute that animals require a change of food for their well being, from which we may infer that even at a particular

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day, and not to drink when they eat. A patient of his said to me, I am a proselyte to his doctrines—does he practise what he teaches? I said, I will give you a faithful account of his dinner today, for I dine with him at the Free Masons' Tavern. I sat next to him. He took turtle and punch, fish, venison, champagne, pastry, cheese; and now, said he, waiter, bring me a glass of brown stout; after this he took his wine moderately as we all did."

* Yet an exaggerated and ill-regulated abstinence is as dangerous as any other remedy. I have no doubt that many a life has been lost by carrying it too far, perhaps as many as from the opposite error.—*Ancell.*

† No man who has practised medicine in warm climates can think of Dr. Johnson but with feelings of the highest respect for his originality and accurate observation. Let any man, however, read his essay on morbid sensibility of the stomach and bowels, and, reflecting on what he has himself observed, say whether he has not elaborated a rare instance into a generality.

meal some variety is advisable. Experience has shewn, and reason upholds it, that concentrated food is not favorable to health, as it does not harmonize with the elaborate structure of our organs, or with the natural process of digestion, chylification and absorption, as performed in the whole truck of the alimentary cancel. Bulk is necessary, particularly with reference to the proper peristaltic action of the intestines. This view of the subject seems strengthened by the known good effects on some people of large quantities of ripe grapes or mangoes. Johnson holds out the example of the natives with their vegetable diet, as worthy of our imitation; but it seems evident that he was not aware how much they suffer from disease, or (of what I believe is undoubtedly true) that the Mussulman, who eats animal food, is generally healthier than the Hindoo. The truth would seem to lie here, as in other things, between the extremes of the argument; and a mixed diet would seem undoubtedly the best. Animal food is the most nourishing as well as the most easy of digestion; but for those who will bear it, and especially for the full-blooded and recently arrived, a free admixture of well cooked vegetables is very advisable.* In fact, though I am against the living by rule system, I think every man ought to observe in a general way the kind of diet that agrees best with him Every individual may have peculiarities with regard to particular articles of diet. I know a gentleman who is almost poisoned by one prawn, and I know others who can eat a quantity with impunity. When the head keeps clear, and the bowels moderately open, we may feel satisfied our diet is correct, regardless of slight local symptoms of indigestion. The full-blooded require to be moderate, especially in the consumption of animal food. The system of taking only one full meal in the day is opposed to all we know of the physiology and anatomy of the digestive organs; three, or at least two, moderate meals are advisable.

substances not over-concentrated.

Vegetable diet of natives does not protect them.

Mussulmans healthier than Hindoos.

Mixed diet the best.

Individual peculiarities.

Practical rules.

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* Animal fibrine allumen and caseine have each a representative in the nitrogonized substances of the vegetable kingdom.

Effect of food on the operation of the intellect—Sir Isaac Newton.

We are told that the finest operations of Newton's wonderful intellect were performed on an empty stomach, and even after starvation. This may be, as it is true that a full meal may and does oppress the brain for a time, but unless the great mathematician had taken sufficient food to keep his blood well nourished and his brain supplied with a sufficient quantity of well oxygenated and well chylified blood, the Principia had never fallen from him, and the apple might be falling yet, without his making the application of it which he did to explain the system of the universe.

Starvation sometimes advisable.

In some diseases, of course, a strict system of diet is of the utmost consequence, and many incipient ailments are doubtless curable by temporary starvation. It is a continued system of starvation or bad diet that I reprobate. I have long been inclined to think that children after being weaned are fed too much on farinaceous diet, arrowroot and sago for instance; and it appears to be true that, as these substances are pure starch, wanting therefore in nitrogen, they cannot renovate or promote the growth of the organized tissues. Dealing practically with the question,* I certainly have often thought that this kind of nourishment makes children look flabby, languid and ill-nourished; one obvious consequence is to load the stomach and bowels, when much less bulk would be more nourishing in the shape of animal food.

Diet of children.

Drinks.

Remarks upon artificial drinks.

That water is the natural drink of man is no doubt true, but every thing shews that it was intended man should exercise his invention to render the products of the earth subservient to his wants and uses; and we may surely infer that when the beneficent Creator gave us the intelligence to produce these things, and the desire to make use of them, their moderate enjoyment cannot be hurtful. If man yet roamed the woods and lived according to nature, he would assuredly seek no drink but the limpid stream. As the case stands, even in his most barbarous condition his diet, his drink, his clothing, his accommodation, all his habits, are artificial; and I am not sure that the question is yet entirely solved how far his life is prolonged or shortened by meretricious habits. The Hindoo does not escape disease by water-drinking, no more did the traveller Jacquemont.* There are several questions regarding the use of water as drink which are worthy of notice, but can here only receive it briefly. The blood of different individuals has been proved to contain water in different proportions, and this would appear to depend on circumstances irrespective of the quantity of drink taken. Denis gives the following results as the proportions of water in a thousand parts of blood. In children, very old people, debilitated, etiolated and badly nourished individuals, 835.4.

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* I refer to Leibig, page 66, &c. where it is argued that the carbon contained in the sugar of the milk of young animals goes to combine with the oxygen from the lungs, and thus admits of all the constituents of the other nutritive ingesta going to the repair and growth of the tissues; but, according to Alison, it is not at all certain but nitrogen may be absorbed from the atmosphere under some circumstances. It is difficult otherwise to account for rice being so nutritious.

The assimilating organs appear even to decompose principles which are still considered as elementary, nay to form azote or carbon.—*Prout.*

Man's habits artificial in all respects.

Use of water.

In adults, in a healthy condition, with ordinary physical force, of a lymphatic, sanguine, or sanguineo-nervous temperament, 810.5.

Very vigorous subjects, with great physical force and a more or less sanguine temperament, 777.8.

The water of the blood is received through the stomach and intestines, and those proportions of it which are not required for the blood pass off soon after absorption by the skin and kidneys. Even taking into consideration the diminished action of the kidneys in the hot months, there is an increased secretion from the skin; but the amount greatly depends upon the quantity of fluid we drink. This brings us to the question how far the potation of large quantities of fluids is healthy or other-

Water of the blood.

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* However of the twenty-five one only was a water-drinker; the other twenty-four drank each a bottle of claret daily, and the water-drinker and he alone fell ill of ague there.—*Anecdote by Dr. Gregory.*

Too free use of condemned.

wise. No doubt even water-drinking is partly a habit, in which the more we indulge the more we require it. It must be admitted that cool drinks afford great comfort, as they produce a free discharge from the skin, and thereby have a refrigerating effect. Perhaps too they prove useful, by producing increased discharge from the kidneys, thus purifying the blood ; but the inordinate use even of this bland liquid must be condemned. It is unnatural—it stimulates the skin and kidneys too much, and in some habits it seems undoubtedly to promote obesity. As the quality of water is a matter of considerable importance, I place in a note below directions for purifying it, extracted from the article on dietetics in the Cyclopedia of Practical Medicine.*

Wines.

Remarks on the use of.

Moderate use of approved of—moderation here different from that of a cold climate.

Alcohol in wines modified by acids, &c.

The general question how far the use of wines affects human health has often engaged attention, and does not seem yet to be settled. Perhaps the truth is that, if our diet were simple, our drinks ought to be so too—that, as it is not, the moderate use of wine may be considered wholesome ; but the question I have to deal with is the use of wine in this climate. Here too I think the observation I have made regarding the nature of our diet will hold good : as the nature of our food, and the manner of cooking, &c. are altogether complicated and unnatural processes, there is nothing against reason in supposing that an artificial liquid may come to aid the processes. At any rate it is quite true, I think, that most men may indulge in the moderate use of wine with impunity, but it must always be recollected that what is meant by moderate here is a very different thing from what it means in a cold country. It has been proved that alcohol exists in wines, and not merely its elements, as was at one time supposed; but the nature of its combinations with vegetable acid and extractive makes it much less hurtful than purely spirituous liquors. It is even true that wines with the same proportions of spirit exert different effects according to the other ingredients.* Of all wines good claret (all wines should be good, and are wholesome in proportion) is the best; champagne, sherry and madeira, and the light wines of France, may all be mentioned as good, but the latter are very apt to become too acid. Of the use of ardent spirits, except in the very smallest quantities, and greatly diluted, one can scarcely speak too strongly in the language of reprobation. The spirit-drinker almost surely sinks into an early grave, the mind and the body usually alike degraded by the fearful habit; fearful it may well be called, since few have ever been able to overcome it. Beer is the most harmless of all liquors containing alcohol: it has a small quantity in its composition, and contains bitter and extractive, the one tonic, the other nutritious.† It is even useful for weak, low-toned and languid constitutions.‡ For the full-blooded inclined to take on fat, it may be dispensed with, or at any rate should be used moderately, if a sedentary life is unavoidable. It generally tends to keep the bowels lax, and, when it has this effect, has less tendency to produce obesity, so that here we have a sort of guide by which we may regulate its use. Excessive indulgence in the use of beer produces that kind of impaired constitution described by many London surgeons as common among great porter-drinkers.§

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* Another mode of improving water, and one which has lately been adopted by Mr. Robins in his patent filters, is by the application of charcoal, a substance which possesses in an eminent degree the property of preserving water from corruption, and of purifying it after it has been corrupted. Hence the filtration of water through alternate layers of sand and charcoal offers the readiest and most effectual mode of abstracting its impurities with which we are acquainted.

Hard water should be boiled.

Best kinds.

Use of spirits condemned, except in the smallest quantities freely diluted.

Beer, remarks on the use of.

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[*] Port wine contains 23 parts in a hundred of pure alcohol; sherry about 20; madeira 24; marsala 25; burgundy varies from 12 to 16; claret from 12 to 16; wines of the Rhine from 8 to 15; champagne about 12.

[†] The beer used in India contains about 5 per cent of alcohol.

[‡] Dr. Pareira, in his practical work on diet, writes as follows of our Indian beer: "the pale ale prepared for the Indian market, and therefore commonly known as the Indian pale ale, is free from these objections; it contains double the usual quantity of hops—it forms therefore a most valuable restorative to invalids."

[§] On examining St. Martin's stomach after a debauch, Dr. Beaumont found its mucous membrane covered with inflammatory and ulcerous patches, although he complained of nothing.

Extract from Dr. Combe on diet.

" Many persons without experiencing any real thirst habitually indulge in potations of water or beer at all hours of the day, and to an extraordinary extent, and feel unhappy when suddenly restricted in the indulgence. But this temporary discomfort ought not to be considered as indicating that these potations are really necessary, because the same result happens in the analagous instances of smoking or snuffing. All these are abuses and perversions of nature, and the uneasiness attending the sudden leaving off of the beer or water-drinking is no more a proof of either fluid being required, than that consequent on giving up cigar-smoking is an indication that nature designed the lungs for the reception of the impure effluvia of the tobacco leaf instead of the fresh breezes of heaven."

General remarks on the use of fluids at meals—author's reason for not condemning the practice.

In opposition to those who condemn the use of fluids during meals, I might be content to remark that it is a universal practice, and therefore seems to be founded on a natural law ; but I may add that the absorption of fluids takes place with amazing rapidity from the stomach, and that dilution of the aliment to a certain extent is favorable to digestion. In concluding this subject I shall add for the reader's information the result of the highly interesting experiments made by Dr. Beaumont, in America, on a man who had an opening in his stomach. It will be seen that as much often depends on the manner of cooking food as on the kind of the food itself, nor is the most easily digested food always the most nourishing. Perhaps the remark I add may be correct that in the full-blooded, apt to be over-nourished and to make blood too fast, indigestion to a certain extent is useful and fortunate. The corollary might be that occasional irregularities in diet may be useful—certainly the greatest eaters are by no means always the stoutest men.

The results of an interesting case of wounded stomach to be given in conclusion, shewing the digestibility of various substances.

Deductions.

Results of Dr. Beaumont's experiments.

We have stated that Martin's stomach, having been perforated by a musket shot, healed, the aperture not becoming closed ; and that, in course of time, a valve grew down over it, which completely retained the food, unless it was intentionally lifted up, in which case the food, at any period of its digestion, could be extracted and examined. This, of course, enabled Dr. Beaumont to ascertain, with much precision, the relative digestibility of different kinds of food; and the following may be taken as a condensed view of the results of his experiments.

OF FARINACEA.—Rice boiled soft was perfectly converted into chyme in an hour; sago in one hour forty-five minutes; tapioca, barley, &c. two hours; bread, fresh, three hours; stale two hours; sponge-cake, two hours thirty minutes.

OF VEGETABLES.—Cabbage, raw, two hours thirty minutes; boiled, four hours (vinegar much assisted its digestion); potatoes, roasted, two hours thirty minutes; boiled, three hours thirty minutes; carrots, boiled, three hours fifteen minutes; beet, boiled, three hours forty-five minutes; turnips, boiled, three hours thirty minutes; beans, boiled, two hours thirty minutes; parsnips, boiled, two hours thirty-one minutes. Continued.

OF FRUIT.—Apples, sour and hard, two hours fifty minutes; mellow, two hours: sweet and ripe, one hour thirty minutes; peach, mellow, one hour thirty minutes.

OF FISH AND SHELL FISH.—Trout, boiled or fried, one hour thirty minutes; codfish, cured and boiled, two hours; oysters, undressed, two hours fifty-five minutes; roasted, three hours fifteen minutes; stewed, three hours thirty minutes; bass, broiled, three hours; flounder, fried, three hours thirty minutes; salmon, salted and boiled, four hours.

OF POULTRY, GAME, &c.—Turkey, roasted, two hours thirty minutes; boiled, two hours thirty-five minutes; goose, wild, roast, two hours thirty minutes; chicken, fricasséed, two hours forty-five minutes; fowls, domestic, boiled or roast, four hours; ducks, tame, roast, four hours; wild, roast, four hours thirty minutes. Continued.

OF BUTCHER'S MEAT, &c.—Soused tripe and pig's feet, fried or boiled, one hour; venison steak, broiled, one hour thirty-five minutes; calf's or lamb's liver, broiled, two hours; sucking pig, two hours thirty minutes; mutton, broiled, three hours; boiled, three hours; roast, three hours fifteen minutes; beef, fresh, Continued.

broiled, three hours; roasted, three hours; lightly salted and boiled, three hours thirty-six minutes; old, hard, salted, four hours fifteen minutes; pork steak, boiled, three hours fifteen minutes; lately salted and boiled, four hours thirty minutes; stewed, three hours; roast, five hours fifteen minutes; veal, broiled, four hours; fried, four hours thirty minutes.

VARIETIES.—Eggs, raw, two hours; roasted, two hours fifteen minutes; soft boiled, three hours; hard boiled or fried, three hours thirty minutes; custard, baked, two hours forty-five minutes; milk, two hours; butter and cheese, three hours thirty minutes; suet, four hours thirty minutes: oil, somewhat longer; apple dumpling, three hours; while calf's foot jelly was digested in little more than half an hour.

Solid food of a certain texture is easier of digestion than fluid.

Digestion is facilitated by minuteness of division and tenderness of fibre, and retarded by opposite qualities.

During fever, and when the mind is much excited, the gastric juice is not secreted, though the usual stimulus of food be applied.

Water, ardent spirits, and most other fluids are not affected by the gastric juice. Query by myself,—do they not take up articles of which they are solvents?

Animal food and farinaceous aliments are more easy of digestion than vegetables.*

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* I have copied most of the above from Lord's Popular Physiology.

### CLOTHING.

Clothing for the hot weather.

On the subject of clothing I have not many remarks to offer. In the hot weather it adds greatly to personal comfort to have our garments light and loose-fitting, on which subject we might take a leaf from the native book; but temporary comfort may be one thing, and general good health another. It is better to be a little too warmly clothed than the reverse, and when the seasons are changing we should be especially careful on this head, putting on woollens early in the cold weather, and continuing them till the hot season has fairly set in. Flannel next the skin I consider that every European should wear as a safeguard to his health. Under all circumstances, after profuse perspirations, our dress should be completely changed, and the skin rubbed dry with a hard towel. This is a golden rule, the more so because it is simple. It should never be forgotten that the nerves and vessels of the skin are in a state of excitement for a great part of each year, and so liable to be affected by very insignificant impressions. Professor Alison remarks, in page 60 of his Outlines of Pathology—"thus the natural temperature of the body applied suddenly to a part previously long chilled by frost, produces just the same local effects as the temperature of 212 on a part not previously cooled." It is on the same principle that the sudden extraction of a small portion of heat acts upon a part which had been long and unduly heated.*

Warm clothing recommended early on the change of weather.

Flannel also advised to be worn.

And change of dress always after exercise.

State of the skin produced by high ranges of temperature.

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* "You may admonish the bather that, after walking in a hot sun to the river's side, he had better not wait to cool himself a little before he plunges into the stream."—*Watson's Lectures.*

### PERSONAL HABITS.

General remarks. Necessity of a man observing for himself.

When I proposed to make some remarks under this head, I had in view that there are many minor points of hygeine which are in a man's own keeping. He need not be a hypochondriac, but he may fairly exercise his own intelligence to guard his health. Thus he can know what kinds of food and drink agree best with him, and when his principal meal should be eaten. He can learn by experience the quantity of sleep he requires (most will feel the ill consequence of late hours), and the kind and amount of exposure likely to affect him. Minute detail would be tedious; two more points I allude to—personal cleanliness, and the daily and regular worship of a certain goddess.*

As to sleep, exposure, exercise, &c.

Bathing.

The bath daily is essential to health and comfort during the hot seasons—many indulge in it in the cold weather, but for most washing with tepid water is safer at that time. I am not sure, indeed, but that at all seasons bathing in tepid water is more refreshing than cold. The swimming bath I am inclined to think gives too long and too decided a check to the action of the skin. Late hours and sudden changes in habits are always objectionable, but especially so at unhealthy seasons, and more particularly during the prevalence of any epidemic. Cleanliness, exercise, moderate diet, avoidance of undue exposure, a judicious government of the mind and passions, these are some of the means for preserving health over which the individual has control. The importance of this will appear if we consider that no two men's constitutions are the same, and that it is by an attention to minutiæ that sanatory objects are to be obtained.

Tepid bath advisable in most cases, and especially in the cold season. Swimming bath rather objected to.

Cautions to be observed during the prevalence of epidemics.

Importance of individual observation.

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* The mischief arising from the use of purgatives is a favorite subject of condemnation with most writers. I am sure it is more hurtful to leave the bowels constipated, and we may regulate the use of vegetable aperients combined with soap, so as to imitate nature in the diurnal movement. It is true that in this country constipation is by no means so common as in Europe, but on the other hand it is more prejudicial.

Cheroot-smoking is one personal habit very prevalent in India deserving remark. There is nothing which shows the different effect of different narcotics on individuals more clearly than to see one man sickened by a single cheroot, and another smoking twenty in a day without any immediate or apparent effect; but as this is often the effect of habit, it shews also how the nervous system accommodates itself to the impression. A few cheroots during the twenty-four hours may be harmless—to most men one or two of a morning often obviate the necessity of taking physic; but the habit of smoking is very apt to gain ground, and to be indulged in to excess. Certainly many a nervous system is shattered, and many a digestion greatly impaired, by the habit. That it gives any immunity from fever may be true with regard to those who indulge moderately—excess here is bad like every excess. I would say that any man who smokes more than four cheroots a day is over-indulging. Tobacco is certainly a very slow, but it is a very sure, poison. We hear many observe that it cannot hurt them because they do not accompany it with brandy and water. Now I have observed that these are the very men who smoke to the greatest excess, partly I suppose because they can indulge the one habit independently of the other. These are what we may call the peripatetic smokers, who cannot walk home from Mess, or to their stable, or go a stage in a buggy, without lighting a cheroot. They are not philosophers, but we may call them new lights. "And in many instances," says Dr. Billing, in his Principles of Medicine, "excess in snuff or tobacco injures the health by imperceptible degrees."

Cheroot-smoking.

Continued.

Effect on the nervous system.

Moderation enjoined.

Excess condemned.

Bad, even without brandy and water.

Quotation from Dr. Billing.

### POSTSCRIPT TO THE SECTION ON DIET.

When I consider the modern views on the subject of diet, and especially the chemical doctrines that connect the increased production of heat with the quantity of animal food we consume, and the consequent adaptation of vegetable diet to a hot climate as containing less carbon, I feel inclined to doubt the accuracy of my own observation that a mixed diet is the best; but then I bring to my recollection that Mussulmans are healthier than Hindoos, even when the latter are well fed according to their own system; I remind myself of the fact that I have seen for the last twenty years Europeans indulging in full animal diet, and certainly enjoying better health than the native population round them, unless, like the soldiery, they over-indulge in the use of raw spirits, and at the same time expose themselves to other mal-influences;* and I think of a third set of facts, that the Boshmen and Hottentots of Central Africa, the lower castes in this country, and the Dangurs in Chota Nagpore, are free consumers of animal food, while we have no fact that I am aware of to shew that their rate of mortality is higher than among those who live upon a purely vegetable diet. I have lately been favored with the perusal of Col. Sykes' pamphlet on the vital statistics of the Indian armies. He says that we shall find the health of the native soldier in the ratio of his departure from the European system of living. I have endeavoured to shew in other parts of this work that his superior health should be partly attributed to his inhabiting his own climate, and the rest of the difference I must say I believe to depend more upon the non-use of alcoholic fluids than upon the non-consumption of animal food. And here another difficulty meets us: I have lately seen that some of the French corps in Algeria lose 25 per cent per annum of their strength; they I believe do not consume spirits at all.

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* We have no numerical data to prove that an European would live longer in India on vegetable diet than on a diet of animal food, all other things being equal.

As I can have no object but the truth, and will be most willingly convinced if my views are erroneous, and would also like to give my reader the benefit of opinions that differ from my own, I submit the following extracts, to conclude my observations on diet. *(Extract from Forbes' Quarterly Review.)* "Again we have strong grounds for believing that more caloric is generated in the animal body during cold than during hot weather. Indeed this must be so, for as there is a larger absorption of oxygen and a larger formation of carbonic acid in the one condition than in the other, so there must necessarily be a greater developement of caloric produced. It is thus that nature so admirably compensates for the great abstraction of heat from an animal body during winter, when the temperature of the air is so much lower than that of its surface. It is only on some principle like this that we can account for the wonderful uniformity of the temperature of living animals of the same kind in different latitudes—less heat being generated within the body in hot climates, because less is abstracted from it, and vice versa. As we have already explained, the cause of the lesser generation of animal heat in the one case than in the other is the lesser formation of carbonic acid within the body, and this again is in consequence on the one hand of the smaller consumption of oxygen during the process of respiration, and on the other of the smaller amount of carbon received from the food that is eaten. The fruits which serve as the chief means of nourishment to the inhabitants of tropical countries do not contain above 12 per cent of carbon, while the whale blubber and seal oil on which the Laplander feeds contain as much as from 65 to 80 per cent of the same material.* In winter we all find the need of an animal diet—in summer we require but little flesh food, and instinctively long for a lighter diet of vegetables and fruits. We thus perceive how beautifully nature has accommodated all her arrangements to the varying conditions of season and climate, and we at the same time derive an important dietetic rule for the regulation of our living according to the circumstances in which we are placed." I have seen this theory, originally I believe suggested by Professor Liebig, advocated and disputed in many works, and by chemists of equal eminence. It has always appeared to me a difficulty that according to these theories many substances on which we see men and children feed and live on contain very little of any properties of nutrition, but nearly as much for combustion: and, therefore, as much for generating heat as the animal food usually consumed, although they are vegetable, and have the common reputation of being nourishing and cooling. I have in a preceding page alluded to the very small quantity of nitrogen contained in rice, sago, arrowroot, &c. so that, according to the theory I am discussing, they can hardly be sufficiently nutritious; yet the fact is undoubted that millions live upon rice diet. And here, with respect to the calorifiant properties of foods, I will copy the following tables.

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* According to Liebig's theory, whale blubber contains no nutritive principle, yet is it certain that the Esquimaux can subsist upon it. "The bodily strength of the Greenlanders is astonishing."

| Composition of | *Arrowroot.* | *Tapioca.* | *Sago.* |
|---|---|---|---|
| Starch, | 84.29 | 83.87 | 84.87 |
| Albuminous matter, | 3.21 | 3.13 | 3.33 |
| Water, | 12.50 | 13.00 | 11.80 |
| | 100.00 | 100.00 | 100.00 |

*Forbes' Journal.*

Relation of nutritive to calorifiant food.

| | | | |
|---|---|---|---|
| Milk, | 1 | to | 2. |
| | 1 | to | 6½. |
| Sago and Arrowroot, | 1 | to | 26. |
| Starch, | 1 | to | 40. |

*Forbes' Journal for April* 1847.

The next table would appear indeed to shew that starch and, therefore, the foods I have noticed absolutely contain more carbon than ordinary animal food.

Therefore, says Liebig, *(see note 16)* 4 lbs. of starch contain 28.16 oz. of carbon, and 15 lbs. of fresh meat contain 32.64 oz. of carbon.*

Dr. Pareira in his valuable work on food and diet has the following observations on the point now under discussion: "the effect of cold in augmenting and of heat in diminishing the appetite for food is well known. I will not, however, go the length of Liebig in asserting that if we were to go naked, as the Indians, or if in hunting or fishing we were exposed to the same degree of cold as the Samoyedes, we should be able to consume the half of a calf, besides a dozen of candles. For though it must be admitted that the inhabitant of a frozen region requires more abundant food than he who lives in a temperate climate, yet I feel that it is an error to ascribe the voracity and gormandizing powers of some of the natives of the colder regions to the influence of cold only. The Hottentots and the Boshmen of Southern Africa indulge, as is well known, in beastly gluttony, yet this cannot be the effect of the temperature of their climate; while the inhabitants of the Alpine regions of Southern Europe demand no such extravagance of food, nor are the Laplanders conspicuous for such eating."

The next extract I offer is from the pamphlet of Colonel Sykes, already referred to. It bears more particularly on the point of the relative salubrity of animal and vegetable diet, and with a few remarks upon it I will bring this postscript to a conclusion.† "The Hindoostanee soldier lives almost exclusively upon unleavened cakes of wheaten flour daily baked upon an iron dish, and washed down with water. On the other hand all Mahomedans and all low caste Hindoos are consumers of animal food, spirituous liquors, opium, ganja ; and many castes of the Shadras (the Mahrattas for instance) eat mutton and fish when they can afford to do so ; but meat is not essentially necessary to health and strength. Liebig says that only those substances can possibly be called nutritious which are capable of conversion into blood—that meat is readily converted into blood, and that farinaceous food has also this nutritious principle in a high degree. The truth of this profound assertion of Liebig is established by the food of the great majority of the native soldiers of the Bombay and Bengal armies. I have shewn that $\frac{6}{8}$ of the Bombay army consist of Hindoos, and considerably more than half of the whole army are Hindoostanees. These men never taste meat, fish or spirituous liquors, but live I may from personal observation venture to say almost exclusively upon unleavened cakes of wheat or other cerealea baked on an iron dish, and eaten as soon as cooked.* The mortality of this army for twenty years is 1.29 per cent per annum. The great majority of the Bengal army, 83 per cent, consists of a similar class of men, and the mortality is 1.79 per cent. The Madras army in its constituents is the reverse of the other two armies. In the Cavalry there are from 6 to 7 Moosulmans to every Hindoo, and in the Infantry there is one Moosulman to every $1\frac{1}{2}$ or $1\frac{3}{4}$ Hindoo ; but amongst the latter there is a considerable number of low castes without prejudices about food, and unrestrained by the prejudices of caste : therefore the majority of the native troops of the Madras army can eat and drink like Europeans, and the mortality returns shew us that they suffer from cholera as much as Europeans suffer, and that the mean mortality from all causes is 2.095 per cent." *

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* Referring to my remarks on the diet of prisoners at page 13 of chapter 1st, my friend Dr. Goodeve has informed me that a fair calculation of the quantity of nutritive matter in both will shew that 24 ounces of ottah per diem and 4 ounces of peas is a higher scale of diet than the full diet of English prisons. I still insist on the point of variety.

† Colonel Sykes says he has not himself lived on a vegetable diet, nor does he recommend it. One reason for our not advising it is that with respect to imported Europeans the sudden change would be dangerous. I have seen many children who lived almost entirely on vegetable diet, but they did not seem to escape disease. In the climate of Afghanistan the Hindoos are said to have suffered most from chest complaints.

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* Wheat contains 46 per cent by weight of carbon, dry muscular flesh 51.89 per cent.—*See Pareira, pages* 8 *and* 9.

When we are considering quantity (or the quantity of rations), we must not forget that raw meat contains 77.17 per cent of water.—*Berzelius.*

Wheat has only 10 per cent of water, and ottah of course less.

It is curious that Colonel Sykes has omitted to mention the free use of ghee, with 80 per cent of carbon, and pot-herbs, by the sepoys, without which variety, we are told on the best authority, no diet will continue to be nutritious. But the conspicuous conclusion to draw (and the correctness of it appears undoubted) is that on a diet of vegetable food the Hindoo sepoys enjoy a measure of health equal to the troops of England within a fraction, and exceeding that which our troops have in Gibraltar, the Ionian Islands, or Canada. But it is another question to enquire whether this measure of health depends solely upon the use of vegetable diet instead of animal food.† I believe not, because we have the knowledge of the sepoy's temperate habits as to alcoholic fluids—and we know that vegetable diet, if poor in quality, will not protect health—the fact of his (the sepoy's) mortality, when on rice diet—and also that of the Hindoo population in Calcutta—vide note to page 2nd, chapter 1st, of this work. In point of fact, too, this vegetable diet so largely used by the sepoy approaches in nutritive property, as modern chemistry discloses, to animal food; so that in reality it becomes a matter of quantity more than quality. If again, as Colonel Sykes appears to consider, the higher mortality in the Madras native army depends upon the use of animal food, we ought to find Mussulmans die in larger

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* In these tables we have the curious feature that the rate of ordinary deaths in Bengal among European troops for twenty years is 6.23 per cent, and at Madras it is only 3.419. As far as I know, the diet is the same at the two presidencies, but we learn from another table in Col. Sykes' pamphlet that the troops at Madras drink beer in part lieu of spirits, and arrack instead of rum. On what grounds he considers arrack less hurtful than rum I know not. We must not forget either that the European has always lived on animal diet, and that a total deprivation might be dangerous.

† But, query, do they? and what is their real food and drink?

numbers in proportion than Hindoos; but I have shewn that while $6\frac{1}{12}$ Hindoos die in Calcutta the deaths among Mahomedans is only $2\frac{3}{4}$ per cent—vide note page 2nd, chapter 1st. It would seem then that there must be something in the climate, in the duties, or in the habits, of the Madras sepoys, irrespective of diet, to enhance their mortality. It would be an interesting enquiry to arrive at the real truth regarding the mortality of Hindoos and Mahomedans in the Indian Army, and we might even ascertain the proportionate rates among the different castes of Hindoos. The popular belief in Bengal is that Mahomedan soldiers are the healthiest, and I find this borne out (though opposed to the high authority of Colonel Sykes) by the only fact just now at my disposal. Dr. Geddess mentions in his late excellent work (Clinical illustrations of the diseases of India) that in a regiment there were two hundred and forty-four Mussulmans, four hundred and fifty Hindoos of the south of India, and one hundred and thirty three Bengal Hindoos. Twenty deaths from fever occurred within a certain period; seventeen of these among the southern Hindoos, three among the Bengalees, and none among the Mussulmans. The question of diet has gained upon my mind in interest as I have proceeded, but I must conclude by drawing the following inferences from my own study of the subject, which I hope will be found legitimate.

1st. The salubrity of a diet does not depend upon its nutritious qualities alone: bulk, digestibility and variety have to be considered. Bulk may be too small or too great independent of mere quality: for these reasons I recommend a mixed diet, considerable in quantity.

2nd. Cæteris paribus, a cold atmosphere increases the desire for food, and this would appear to depend at any rate in part on the increased inspiration of oxygen. We may deduce the conclusion that we require less food in India than at home, and less again in the hot weather than in the cold; and also that our food should in part be regulated by our exercise.

3rd. The theory of Liebig that nitrogenized principles alone nourish the tissues, and that those without nitrogen serve only for combustion, is not established, and is opposed to facts daily observed.

4th. Health consists in the integrity of the tissues and organs.

5th. Tissues and organs are best nourished by substances that most resemble themselves.

6th. Animal substances come nearest in property to the human organs and tissues.

7th. Of vegetables the grains come next in nutritive quality—wheat of all the most nutritive.

8th. In the climate of India the tissues of Europeans do not appear to be well nourished. The blood loses part of its florid color, the muscles lose power, the skin grows pale, the mind's own energies gradually fail.

9th. The true cause of all this does not seem ascertained, but it is an undoubted fact that less oxygen meets the blood in the lungs.

10th. We do not see that those who consume diet with the smallest proportions of carbon look in better health than others: and, therefore, we may perhaps infer that it is the want of oxygen, not the surplus of carbon, that causes the defective nutrition referred to.*

Dr. Buchanan made the following practical observation, and it has met my eye after I had recorded my own opinion—"Many persons, I am aware, consider that vegetable food highly seasoned with capsicum, and water for drink, is the diet best adapted for a warm climate, but I am persuaded that they are

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| * Nitrogenized food, or plastic elements of nutrition. | Non-nitrogenized elements of respiration. |
|---|---|
| Vegetable fibrine. | Fat. |
| ,, albumen. | Starch. |
| ,, casane. | Gum. |
| Animal flesh. | Cane sugar. |
| ,, blood. | Grape sugar. |
| | Sugar of milk. |

mistaken, and have been misled by observing the sickness of newly arrived troops or seamen, which is too often preceded by excess and intemperance. Whoever I think has travelled much with natives, and been witness to the weakness of their constitutions in resisting the changes of air or water, will agree with me in saying that those who enjoy a diet which includes animal food, and strong liquors in moderate quantities, are best able to resist the influence of unhealthy climates and sudden changes of air."

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## SECTION V.

### MENTAL GOVERNMENT.

Reader, attend, whether thy soul
Soars fancy's flight beyond the pole,
Or darkling grubs this earthly hole,
In low pursuit;
Know, prudent cautious self-control
Is wisdom's root.
BURNS.

Treated of here as far as the government of the mind relates to health.

The subject of mental government may be considered more fitted for discussion by the moral philosopher than by the physician, and to him we shall leave it, except in as far as the government of the mind affects the health of the body. If it be true, as it surely is, that some conditions of mind have an injurious effect upon health, let us also consider that in a rational employment of some of our faculties lie the best means of preserving it. Mental anxieties, the cares, the sorrows, the disappointments, of life fall upon us all. It is then that, in the vain hope of drowning care, so many are apt to fly to the wine cup. Vain, vain hope! avoiding Scylla, they truly fall into Charybdis.

Effect of mind s at times injurious and sometimes beneficial to bodily health.

Anxiety and care the lot of all men.

" A heavy morning comes, your cares return "
" With tenfold rage."

For surely there is no human being so much to be pitied as the besotted, drivelling drunkard—and in shades of a lighter die than that there is much misery. Even the great and the gifted have felt it—

Danger of trying to drown them in the wine cup.

"Tis done—the powerful charm succeeds—"
"His high, reluctant spirit bends,"
"In bitterness of soul he bleeds,"
"Nor longer with his fate contends:"
"An idiot laugh the welkin rends,"
"As genius thus degraded lies,"
"'Till pitying heaven the veil extends"
"That shrouds the poet's ardent eyes."*

He who takes a proper view of this life and its duties receives the frowns *of* adversity with fortitude, and enjoys the smiles of prosperity with moderation.

Moderation enjoined in prosperity and adversity.

I believe that, independent of the mere intelligence by which an educated man is enabled to practise rules of hygeine, the moderate and judicious exercise of the intellect contributes to the healthy performance of bodily function. And even if it were otherwise, who would on that account recommend the abstainment from study and improvement? There is more true enjoyment and happiness in a year of intelligent existence than in many of a mere animal life. Sensual gratifications, and even the innocent recreations of society, pall, and get duller by enjoyment; but the further we go in intellectual pursuits the greater are the pleasures which arise to us, unless we overstretch the string, and it may strain without breaking.†

The moderate exercise of the intellect conducive to health.

Pleasures of intellectual cultivation exceed those of mere animal enjoyment.

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* I might have been more practical on this head of mental government. I might have shewn the particular cares that affect men in India, and the particular temptations that assail them. I have preferred to treat the subject generally—the particular application is easily made.

† What I have written above I find but partly borne out by figures. Quetelet, in his statistics, after a figured statement, makes the following remarks—"it would seem to follow from this table that mental labour is more injurious to man than bodily, but that the most injurious state is that where fatigue of body is joined to that of the mind." The fact he gives, that theologians are the longest lived, is surely in support of my train of reasoning.

For health the mind must be governed as well as cultivated.

I have said that a high cultivation of the intellect is not incompatible with health—that, prudently exercised, I think it may be conducive to it. I may adduce as negative proof that the boor and the savage are fully as subject to disease as men of cultivated mind. No doubt some bodily diseases are brought on and aggravated by over mental exertion; but the proper regulated mind preserves its own health, as well as that of its tenement. There may indeed be a highly cultivated mind, yet full of corruption, as the richest soils produce rank weeds. In both cases disease is often the consequence. By good mental government a man assuredly increases his own happiness in every respect whatever: he cultivates his mind, and in the acquirement of knowledge lie the purest and highest enjoyments of man in this world—heralds as it were of what he has to hope for in another, when he shall hold communion with higher intelligences; he keeps the passions in subjection, wherein consists their most refined enjoyment; by abstaining from all excesses he preserves his mental and bodily health in their integrity; and assuredly Armstrong was right, when he called the daughter of Pæon the queen of every joy. When her smiles are absent, riches—reputation—high employment—the applause and consideration of society—what is their value?

The results which follow.

## SECTION VI.

### PROFESSION.

The influence which profession exercises upon health will be seen in my chapter on public health; but a few observations may not be out of place here.

Influence on health of civil employment.

The fuller employment of the mind which is imperative on the civilian, we have seen does not prevent his having the highest rate of health among the Indian services, and this may encourage the military man to the same pursuits; on the other hand we have said that the civilian's health suffers from leading a too sedentary life, living in dark rooms, and passing many hours of the day in crowded, ill-ventilated courts of law. These, the only mal-influences to which by profession he is exposed, are very easily remedied.

Military profession.

The military man is at times unavoidably exposed to the out-door vicissitudes of a hot sun and rain. If the regulations of the service admitted of it, much might be done against the first, by protecting the head; against wet the surest safeguard is to keep up the circulation of the skin, never to allow the body to get chilled, till there is an opportunity of changing the dress. Moderate but generous living is then particularly advisable.

Medical profession.

I have not been able at this present time of writing to lay my hands upon any thing regarding the vital statistics of medical officers in Bengal. I believe that they suffer more than other officers of the army of the same age, and at any rate they do not suffer in a less degree, though they come out at a better time of life, and though we must conclude that they take more precautions than others against the purely physical causes of disease. All this proves the effect of mental anxiety upon health. No man in any profession suffers so much from this cause at all times as a medical man; and little wonder either, if we consider how much often hangs upon the exercise of his judgment—that judgment has often to be formed on the nicest and most discriminating balancing of circumstances, life or death being the consequence. I repeat that no kind of mental anxiety can be more harrowing than that which a conscientious medical man has to encounter; and, perhaps, if this was more thought of, his labours would receive more consideration, and be appreciated oftener as they deserve.* I am not writing in an angry personal spirit, but stating the result of my general observation. For myself I am proud to say that some of the warmest friendships I have formed in life have been the result of my professional exertions; and, whatever be its cares and anxieties, it is in the zealous, honest and straightforward performance of his duty, that a man has the greatest satisfaction. To prevent the tear and wear to health from professional anxieties, the judicious government of the mind is the only safeguard; temperament has no doubt a good deal to do with it, but our own mental education more.

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* Queletet, in his treatise on man, has the following—" Casper finds that the profession of medicine is more exposed to mortality than any other."

I have observed that in one year at Bombay out of 88 medical officers 13 died, an enormous mortality, the causes of which it would be interesting to ascertain.

Since writing the above, I see that Mr. Edmonds gives the rate of mortality of Surgeons in Bengal at 3.84, Assistant Surgeons 3.21 per cent.

Dr. Finch in his journal gave a table shewing that the 17 years, from 1827 to 1843, both inclusive, there died in the Bengal medical service 66 Surgeons and 118 Assistant Surgeons. This is below the rate given by Mr. Edmonds. There are always 120 Surgeons on the list—the list of 230 Assistant Surgeons may not always be complete.

### POSTSCRIPT TO SECTIONS FIFTH AND SIXTH.

Extract from Dr. Andrew Combe on mental government and profession.

Since I wrote the above, I have had the pleasure of perusing a most valuable work by the late esteemed and regretted Dr. Andrew Combe, of Edinburgh, entitled the Principles of Physiology applied to the preservation of health. I will venture to offer a few extracts, which will be found to confirm the views which my own observation has led me to adopt. "This law of our constitution, whereby the regulated activity of both intellect and feeling is made essential to sound bodily health, seems to me one of the most beautiful arrangements of an all-wise and beneficent Creator. If we shun the society of our fellow creatures, and shrink from taking a share in the active duties of life, mental indolence and physical debility beset our path. But if, by engaging in the business of life, and taking an active interest in the advancement of society, we duly exercise our various powers of perception, thought and feeling, we promote the health of the whole corporeal system, invigorate the mind itself, and at the same time experience the highest mental gratification of which a human being is susceptible, that of having fulfilled the end and object of our being, in the active discharge of our duties to God, to our fellow men, and to ourselves. If we neglect our faculties, or deprive them of their objects, we weaken the organization, give rise to distressing diseases, and at the same time experience the bitterest feelings that can afflict human nature, ennui and melancholy. The harmony thus shewn to exist between the moral and physical world, is but another example of the numerous inducements to that right conduct and activity, in which the Creator has evidently destined us to find terrestrial happiness."

## BARRACK HYGEINE.

" The brave poor soldier ne'er despise,"
" Nor treat him as a stranger ;"
" Remember he's his country's stay"
" In day and hour of danger."

Although I have in the preceding pages of this work alluded in various places to the amount and the causes of sickness among the European soldiery, yet (influenced by the importance of the subject, and, I will confess, feeling my sympathies excited by it,) I purpose to devote a separate section here to the consideration of such particulars in the condition of the soldiers in barracks, as appear materially to affect their health. If I venture to suggest measures of remedy, it is with a full conviction on my mind that the soldiers of no country have more care and solicitude bestowed for their health and comfort than the British soldier serving in India. If things admit of improvement, I for one think that it is because the defects of the present system are difficult to overcome ; that perhaps they are even yet not fully understood ; and that, lastly, all great and extensive improvements must be gradual. I may deal with the subject of barrack hygeine under the heads of locality and accommodation—exposure and exercise—diet and drink—moral character and education.

### LOCALITY.

Under the first head, allusion is immediately suggested to the great movement for cantoning the troops in the mountain ranges. He deserves well of his country who first suggested this great boon to the brave and reckless soldier, and I would name him if I could ; but after all it was a measure so obviously humane, and at the same time so wise, that it probably occurred to many ; and he who deserves the chief praise for it is the man who had the courage to propose so large an immediate outlay, and next he or they who had the liberality to sanction it. When we consider the comparative discomfort of a barrack life in the hot weather on the plains, and the habits which that discomfort, if it does not engender, does certainly encourage, there is great satisfaction in thinking how many soldiers are already located in the hills, and that the movement is steadily progressing.* I have indeed heard that the decrease in the rate of mortality has not been so great as might have been reasonably expected. Regretting that I have not the statistical data before me, I may however remark that, independent of the increased comfort and contentment, added to the improved habits which must occur, we may feel assured that the mortality will be less when there has been time to investigate and to obviate its causes. We may be certain, though, that even in the climate of the hills a strict attention to all approved measures of hygeine will be imperative. With respect to locality, those insisted upon in the general section on the same subject are chiefly important. The cantonments to be built and already occupied on hill and plain must always be kept well drained and clean, on the established truth that this is necessary to health in all climates.

## ACCOMMODATION.

The accommodation of the soldiery is imperfect usually in three chief respects—elevation, space, and ventilation. Latterly these matters have received attention in the erection of new barracks, but some of the old buildings are very defective, and susceptible at the present time of much improvement. Elevation may mean the height of a building, or how much it is raised from the level of the ground. In the first point of view, it is the best manner in which we obtain sufficient room, because the

Elevation of buildings.

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* "It is not surprising," says Dr. Twining, "that the European residents in this country, living in a climate the mean annual temperature of which is 30 degrees of Fahrenheit above the average of Great Britain, should anxiously seek for cooler and more healthy stations."

great object of coolness is obtained at the same time, though of course there is a limit beyond which the solid space would be insufficient and the ventilation imperfect. The advantage of raising buildings from the level of the ground is now fully established, and for triumphant proof of it I may here allude to the instance I have offered regarding Hong Kong in the general section on the subject of accommodation. At the hill stations it will be very essential to pay attention to this point, the damp being very great in the rainy months. With regard to space, we must bear in mind that mere juxta-position is injurious, and that it is always better to have fifty men in each of two buildings than one hundred in one double the size, on the known and observed principle that the aggregation of men is injurious to health. This I believe is one reason why the barracks at Dinapore are so unhealthy ; and that the fault at any rate lies somewhere with the accommodation of Her Majesty's Regiment there, appears clear from the general salubrity of that station, its great fatality to all the Queen's corps that are sent there, and the comparative good health of the European Artillery living close in their vicinity. The whole accommodation for the men, women and children is contained in two large buildings, the dimensions of which I give below.* 600 cubic feet of air are considered necessary for each person in a cold climate, and I believe that most of the barracks in India will be found far short of this, although the high temperature diminishes the actual quantity of the air. Nor will space alone do : we must have a renewal of air as well as a sufficient space to contain it, since the action of the lungs consumes its oxygen, yielding in return carbonic acid, an absolute poison if again inhaled in any quantity. It may be imagined how necessary a constant renewal of fresh air is when I mention that an ordinary pair of lungs will consume 1,440 cubic inches of oxygen in

Space.

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* Length of the two buildings together 1750 feet ; breadth 20 feet ; height 17 feet. More than a hundred feet are taken off by pillars and projections.

an hour, that only a trifle less carbonic acid gas is evolved, and that the air only contains 21 parts to the hundred of oxygen.* This renewal can often be obtained by proper exposure to the prevailing winds, which, when they blow, may be made use of for the securement of free perflation through doors and windows; but while their influence is uncertain the necessities of the inmates of buildings remain the same, and hence the call for artificial measures in all climates, but more especially in hot ones, to obtain a change of atmosphere. Ventilation is almost a separate science of itself, but its object is to secure a fresh supply of good inspirable air.† To increase its temperature is often an object in cold countries—here we wish to lower it whenever it is above 75. Ventilation depends partly upon the law by which heated air ascends, suffering an expansion of 1.500 per cent for every degree; and, as it escapes, if we have apertures in the higher parts of buildings, air will rush in from below to fill up the space. But in this climate this kind of ventilation is imperfect, owing to the great heat of the external atmosphere: hence the necessity of other means for renewing the atmosphere within buildings,—large doorways and windows, tatties, thermantidotes and punkahs. The use of punkahs in soldiers' barracks I do not urge as a luxury, but as a necessity. The late call upon the medical service for an opinion on this subject seems to admit of three fair inferences: 1st. it shews a laudable desire on the part of authority to improve the soldier's health and comfort; 2nd, it evinces that the importance of cooling and ventilating is not yet fully appreciated; 3rd, the fact of the men refusing to pay for the mere outlay

Ventilation.

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* Forty-five thousand cubic inches of oxygen are consumed in twenty-four hours, and forty thousand cubic inches of carbonic acid gas given out in the same time.

† Generally speaking, the ill effects of bad ventilation are not seen in any sudden outbreak of sickness, but they exercise a slow, but sure injurious effect on the organization.

" On the whole then not less than 10 cubic feet per minute are necessary for an adult's healthy respiration.—*Brande's Dictionary of Science.*

of pulling these punkahs discloses how little they value physical comforts, and that to change them in this respect we must do something for their moral improvement.*

On the subject of accommodation I believe there is nothing more beneficial in this climate than having large open verandahs round inhabited buildings, and I think that in this way much might be done cheaply for all, or at any rate for most of, the barracks in the country. They may be made so as to increase rather than retard proper ventilation—they would cool the interior of the barracks, and they would admit of the men taking moderate exercise without exposure, at the same time that they breathed a freer and less contaminated atmosphere. If made sufficiently large, another great object might be attained by them: under the cover of these verandahs the soldiers might play at various games, and, independent of the exercise, which is certainly beneficial, these games occupy the mind, agreeably breaking in upon the dreadful monotony of long days passed in the tedium and confinement of the barrack room. The exercise relieves the system, especially in those who eat and drink freely.

### EXCERCISE.

I have passed on to the subject of exercise somewhat irregularly, but will proceed by repeating the belief I have expressed elsewhere that within bounds it is highly conducive to health among soldiers, if they avoid exposure to the sun's direct rays, and are careful to avoid chills after sweating. Seeing, however, how heedless the soldiers generally are in these respects, it may be a question how far they should be encouraged to take exercise, and how far it is justifiable to restrain them from exposing themselves to the rays of the sun. I believe, considering our peculiar climate, that making athletic games a part of the military exercise would be an excellent plan. The amount of exercise, and the time of indulging in it, might be regulated, and the mind might be moderately and pleasingly interested. The sameness and monotony of parade evolutions counteract part of the effect of the exercise which accompanies them.* I have elsewhere alluded to the necessity of supplying the soldier with a good covering for his head and neck, when he is out of doors and off duty. An officer never thinks of exposing himself during the day, unless his head is well protected; nor does he feel the comfort and benefit of exercise till he has changed his dress.†

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* The day after the above was written the General Order appeared, directing the use of punkahs in all the barracks on the plains. I believe the army is indebted for this boon to him who has so often led it to victory. Much of the space in barracks is taken up, and the ventilation much obstructed, by the enclosures made for the married men.

### DIET.

Regarding the diet of soldiers in the climate of India opinions will be found to differ, as they do on other subjects; and that, strange to say, among the most practical observers. I may quote in proof of this the opinions of two modern writers on the subject. Dr. Fergusson says, "we need not fear the Sybarite—he does not frequent the bivouac, and all the luxuries that the pay of the common soldier can provide will never elevate him. Better then by far that he should worship the belly than worship the wine press or the rum cask." The doctor had an ingenious theory, but I fear one by no means reducible to practice, that indulging the appetite and taste for food might be made a means for tempering the desire for spirits. Dr.

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* The Government have lately shewn great liberality and consideration by erecting swimming baths,—a luxury, an amusement, and a means of securing health; but caution is necessary lest the men should go into the bath after exhaustion, or remain in too long at any time.

† Extract from Government General Orders, 7th March 1835, that the European soldiers be not confined to the barracks except during the heat of the day in the hot season, it being considered that more injury is done to the minds and bodies of men by the despondency and misery produced by the confinement, than could possibly arise from moderate exposure. If this order had gone on to allow the soldier to wear a head dress, when off duty, that would protect his head and neck from danger, more advantage would have arisen.

Parkes, in his late work on the dysentery and hepatitis of India, has the following—" the diet of European soldiers in India, varying necessarily at different places, is as a general rule far too rich and stimulating: hot curries carelessly made by native cooks are used several times a week for dinner, and vegetables are in many places scarce or of indifferent quality." Applying the general principles of dietetics to the question, it would seem clear that the point of variety is not sufficiently studied, and that it must be a mistake not to alter the diet roll according to the seasons. It is true that this objection is partly met by the singular state of things by which the soldier is partly fed by rations, and partly by an ad libitum system of messing. He receives the following rations daily—

| | |
|---|---|
| Bread, | 1 lb., or 2 lbs. rice, when bread is not procurable. |
| Meat, | 1 lb. bones included. |
| Rice, | 4 oz. |
| Sugar, | $1\frac{2}{7}$ oz. |
| Tea or coffee, | $\frac{5}{7}$ oz. |
| Salt, | 2 oz. |

According to my information, the soldier is never satisfied with this amount of food, and as he is not a pampered feeder this may teach us a lesson in dietaries. He consumes in every instance in excess of his rations. The food is supplied on contract to the men in messes, and costs on an average from 2-8 to 3 rupees a man per mensem. I am able through the kindness of a friend to subjoin a dietary of the food used by the Artillery at this station, and paid for by themselves.

Two days in the week.—beef, potatoes, greens and condiments. milk morning and evening.

Two other days,—beef, curried mutton, vegetables, &c. as above.

Two other days,—with beef, tarts or puddings, condiments, &c. as above.

One day,—mutton and vegetables, condiments as above.

Dr Fergusson, though he advocated a liberal diet, strongly argued in favor of a large proportion of vegetables in a hot climate—"an abundant vegetable ration duly mixed and seasoned would be far better, and this I believe to be consonant with the truest physiological principles, when considered in relation to temperature and climate." Viewing the question practically, it is perhaps only in two ways we can look for improvement: 1st, by bettering the quality of the beef and bread, and none who have seen them will doubt that both might be of better quality; 2ndly, if we raise the condition of the soldier as to intelligence and moral conduct, we may expect him to pay more regard to the influence which his diet and other circumstances exercise over his health. I refer to the remarks on moral character and education.*

### DRINK.

Water

The melancholy interest which attaches to the subject of the use of spirits, as affecting the health as well as the morals of soldiers, seems to have left us inattentive to the quality of the water they make use of. It is raised from wells, and then placed in large earthen jars for use; and I believe I am justified in stating that the points of purifying it or keeping it sweet are little, if at all, regarded. Yet in our own case this is a matter in which we are most particular. We know that water gets fœtid in a very short time in this climate, as it contains much animal and vegetable impurity. We are solicitous and careful to obviate this, for we know by experience that bad water is unwholesome. We keep its reservoirs clean—we boil it and filter it through charcoal—all simple and cheap expedients.

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* The quality of the animal food obtainable by purchase in the bazars of this country is very inferior. I have ascertained that the soldiers at this station are in the habit of consuming pork, without much regard to the manner of its feeding. We need not doubt that such food must be pernicious.

Spirits.

To enlarge on the moral and bodily disease produced by the soldier's over-indulgence in the use of ardent spirits, is only to travel over ground that every writer on tropical disease has already done. The cause and the effect are painfully and obviously notorious and undoubted. The remedy remains the question. I agree with the writer so often quoted, that neither acts of parliament or sermons will put a stop to it; but I think we may moderate the mischief in many ways, and that, if we hope to eradicate it, we must apply ourselves to a serious consideration of the moral and physical causes which produce it. I shall consider these last parts of the question under moral conduct and education, confining myself here to the practical means at our disposal for moderating the use of ardent spirits. How stands the case at present? The soldier's pay is, say, from 10 to 14 rupees per mensem,* out of which deductions are made for clothing, cooking, dieting, shaving, &c., leaving him a monthly balance, however, which even at the canteen furnishes him with abundant means of drinking, and in the bazar of this station spirits are to be had of all kinds and in any quantity at very low rates. I believe it is the same in all military stations, and no regulations will I fear be found practically effectual to prevent their sale to the soldiers. But certainly we might expect to prevent in some measure the open violation of the law which prevails in this respect, and one means of doing so would be to discourage the production of country spirits in the vicinity of all cantonments. At present it is a curious state of things to see the government letting the spirit farms in cantonments to the highest bidders, thus obviously encouraging production, and at the same time forbidding the sale of spirits to the soldiers, I fear, without effectually checking consumption. The expediency of suppressing the sale of liquor in cantonments is unquestionable, though it is difficult to do it without very stringent rules and a large and trust-worthy police, the more especially if the canteen's rules are strict; and this brings us to the second source of supply. Canteens were instituted with a benevolent intention: it was thought that in them the soldier would be supplied with a spirit comparatively wholesome—he was no longer served with spirits, whether he liked them or not, but received compensation in money, if he preferred it—it was considered that it was preferable he should drink without exposure, and while under control—and in the canteens it was ordered he should only be allowed a certain quantity, while they offered him the opportunity of supplying himself with beer, tea, coffee, &c. Surely this is a preferable state of things to what existed before it; and I may again urge that, while he has thus the means of indulging in a habit which, though injurious, it would not perhaps be prudent or just to try to suppress with the strong arm of power, it would surely be justifiable to abolish the other source of supply—the sale of spirits in the bazars. Canteens are in many ways admirable institutions,—sources of comfort, enjoyment and respectability in a regiment. In an article I have lately perused in the *London Quarterly Review*, entitled the education and lodging of the soldier, the author expresses his opinion that the sale of spirits, and perhaps of beer, should at once and for ever be put a stop to in all canteens. If I thought that doing so would cure the habit of drinking in the soldier, and was a measure in itself practicable, I would agree with the writer; but the question is far too important and difficult to be disposed of on the mere fiat of a theoretical writer. It is, however, deserving of the most mature consideration. Supposing that it will not be deemed possible at the present time to forbid the sale of spirits in canteens, we are left to consider how we may moderate its consumption. Limiting the daily supply to each man is necessary, but perhaps not very useful, unless we can prevent his supplying himself elsewhere. It appears to me that the great practical measures would be to give the soldier good beer at a much cheaper rate than he can now procure it, and to employ a separate establishment for suppressing the sale of spirits.* It is well established that beer is far less destructive to health than spirits—the very intoxication it produces is of a more harmless character, and leads to less commission of crime. I say, therefore, emphatically, that no measure would be more practically useful than one which would insure a regular supply of good, cheap beer in the canteens. There is even statistical proof of the good effect which would ensue, but while beer sells at its present price in India, including duty, there may be public orders recommending its consumption by the private soldier, but they cannot be acted upon. I consider myself that it is visionary to hope by any means whatever at once to suppress this habit of drinking in the British soldier. By slow and moral means we may effect it, but this measure of substituting beer for spirits might immediately be brought into extensive and useful operation.† I learn indeed from a pamphlet which I have lately seen on the vital statistics of the Indian Army, by Col. Sykes, that beer and porter are sent to Madras and Bombay for the use of the troops. Why not also to Bengal?

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* The pay varies a trifle according to the number of days in the month, and length of service—after fourteen years 10-10-3 per mensem, besides compensation money 3-2 per mensem.

### MORAL CONDUCT.

A great modern painter of human manners has in his latest serial presented us with a melancholy picture of the effect of want and physical discomfort upon crime and morals, and in beautiful and emphatic language he has exhorted us to pity before we blame the wickedness which is the offspring of a melancholy necessity.‡ A superficial view of the subject will lead us to the conclusion that the soldier has little to offer in extenuation of his loose morals; but I would fain persuade myself that part of his crime must depend on the peculiarity of his position. Absolute want he is a stranger to, but still his social position is unnatural and uncomfortable, and holds out temptation partly by the very absence of a stimulus to industry. The physical discomfort of an Indian barrack room in the hot season must I think tend to encourage dissolute habits. The high temperature makes a soldier irritable, discontented, and inclined to seek solace in drink—a vain hope! for he is only adding fuel to the fire. "All authors, and indeed every observing person who has visited the torrid zone," says Dr. Combe, "agree that, with the languor and exhaustion resulting from the high temperature, there is a greatly increased mobility of the nervous system." The above remarks and quotations go surely to prove the necessity of keeping the soldiers' barracks as cool as possible,—a physical means for a moral end. The confinement and want of employment in an Indian barrack are other prominent physical discomforts that have an obvious and undoubted ill effect on the morals of the soldier. In his own climate he can move out at all hours and seasons; he can associate in language and feeling with those around him; if he is an idler, he does not feel it, for the mere locomotion is a kind of employment to the mind and body.* In this climate, during the long days of the hot seasons, choice even, from his dull perception of physical comfort, keeps him in his barrack, where he is without occupation for mind or body—idleness, the proverbial nurse of vice, exercises the usual effect on him. Before we blame him severely, let us try to remedy the evil of his position, and see, if we give him the opportunity, whether he will not avail himself of it. Encouraging men to practise various trades will suggest itself to most people, but the practical observer will think of the want of necessity to work for hire, the cheapness of labor enabling the native to sell at low rates; and the difficulty the soldier has in disposing of his savings is yet applicable to the Honorable Company's troops, though Her Majesty's warrant of October 1843 secures the long urged for boon to the royal troops of being able to invest their savings easily and advantageously. When we consider the numberless ways in which a man can employ his mind and his hands usefully, and that not doing so is a source of wretchedness to himself, it does seem strange that men should be allowed to die of mere want of occupation; but as the soldier is enlisted at present for mere military duty, it may perhaps not be easy to obtain suitable in-door employment for him which can be enforced, though it would no doubt be for his own benefit to give him moderate occupation. It has lately been proposed to have gardens attached to barracks, in which the men might work and raise productions for their own use, nor are instances wanting of the successful out-door employment of our troops on public works in a tropical climate. The real practical measure which would be advisable may be questionable, but it seems beyond doubt true that some scheme which would change the present state of monotony and idleness in barrack life would be effectual beyond most things in improving the moral as well as the physical health of the soldier. It is true that the great bulk of recruiting takes place from among the most dissipated classes at home, but if we consider the many advantages a soldier enjoys, well fed, well clothed, and well accommodated comparatively, it does seem a matter of surprise that his mind and his body are so prone to disease. I have lately read an article on this subject in the *Times* newspaper, from which I made the following extract: "the entire system of barrack life must be modified as necessity no less than humanity dictates." The moral debasement which arises from the aggregation of human beings is a most curious subject of speculation. In the soldier's case there is one particular connected with this which is peculiarly demoralizing, but we may feel satisfaction in thinking that the evil is small at present in our Indian barracks compared to what it has been, and may be yet for aught I know in the barracks at home. I allude here to the want of private or separate accommodation for the married men. Things are bad enough in this respect in our Indian barracks, not only destructive of native instinctive female delicacy, but having its evil influence too by a reflex action on the other sex. The description given by the writer in the *Quarterly Review* already quoted of the outrages which the mind of a modest woman must receive when she becomes the inmate of a barrack need not be given verbatim. It is too plainly spoken, nor does it I am happy to say quite apply here. The accommodation of the married is screened off to a certain extent, more might and should be done.* It has often occurred to me that if we could increase the intercourse and strengthen the ties that bind officers and men together, without weakening the chain of discipline, the moral effect upon the private soldier must be beneficial. At present, speaking generally, the intercourse between officers and men is purely of an official character. The influence of a higher mind over a lower one is lost on all points save those of discipline. In the history of the Highland regiments, by the late General David Stuart, will be found many examples of the effect upon the soldier's conduct when he is commanded by officers who feel an interest in his well-being, look to his wants, hold a community of feeling with him on some points, and in a certain manner associate with him. We may feel surprise that the religious instruction the soldier receives exercises so little effect on his moral conduct † This is a subject which I feel to be out of my province, but I cannot help saying that I have heard little that is practical, that deals with his particular frailties and temptations, preached to the soldier. The sermons are more usually addressed to the higher classes of the congregation, who have more other means of learning what is good, and less too to lead them into temptation.

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* May be, I might add, raising the price of spirits in the canteen, and reducing it a little if diluted with water.

† My enquiries lead me to believe that in some regiments the consumption of beer is encouraged, though doing so interferes with the canteen fund, the surplus of which is applied to so many useful purposes; but I think I am correct in stating that no canteen can afford a full supply of good beer at rates suited to the soldier's means.

‡ Insanity and crime (says another writer, Dr. Moore,) are equally pitiable.

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* As the mind acts on the body, so does bodily condition and engagement react on the mind. Hence to render the situation agreeable, and to engage the senses and the limbs in such a manner as to divert the thoughts from wrong courses, is the secret of success.—*Dr. Moore.*

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* Since writing the above, I have seen a leading article in the *Times* newspaper, from which it appears that this horrible state of things still exists at home.

† The scheme of educating the soldiers' children in the hills reflects high credit on the name of Colonel Lawrence, but we may doubt the good effect of it on parents deprived of the society and affections of their children.

## EDUCATION.

The effect of education upon human morals and health we might take for granted would be beneficial, on the great organic law that the moderate exercise of all function and organism is salutary; but the question is not quite so simple as this view of it would make it appear. It is certain that we may have a high scale of health and morality, with a very limited or even with a total want of education, when other circumstances are favorable; and so also is it true that vice, disease and education may be co-existent.* Leaving the general question to those more competent to deal with it, I am to consider whether the present system of regimental education might not be altered to the mental and corporeal benefit of the soldier. When we consider that the soldier has not the stimulus of necessity to make him labor with his hands, and that an acknowledged source of his errors, and the consequent disease, lies in idleness, we appear to have no finer practical field for mental exercise and instruction; but considering his age, and his previous habits, it would seem to me that the irksome plodding of school teaching is less suited to his circumstances than would be a course of lessons which would make him acquainted in a familiar way with the rationality and happiness of virtuous habits, with the practical application of the sciences to the business of life, the evidences of design in the works of creation, and with the wonderful beauty and variety of the objects which it contains. It may be true that vice and knowledge may exist together, but none can say that they stand in the relation of cause and effect. It is but natural to think that the proper study of the works of creation must refine the intellect, and, even if we had no higher motive to offer, we might shew that temporal happiness is promoted by virtuous habits.

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* The connexion between intellect and moralty, however, is not sufficiently considered in our education, which, to be correct, must be conducted with especial regard to our physical, constitution as that of sensitive as well as reflective beings.—*Dr. Moore.*

Many of the present teachers might not perhaps be found equal to the task I am suggesting to impose on them, and I believe even as teachers of the common rudiments of education they are often very deficient. Raising the qualifications of teachers is in every point of view desirable for the object I contemplate, (and I believe it would insure the attendance and instruction of many more adults than now attend the schools.* Nor need it interfere with the present system: it would not be necessary to teach the soldier the higher and abstruse branches of the exact sciences; the wonderful and sublime calculations by which the size, distance and movements of the sun and planets are ascertained, need not be fully explained; but the soldier's mind might be instructed by the fact that human genius had arrived at such wonderful conclusions; had proved indisputably that the sun, whose heat and light are so essential to the present conditions of this earth, lies 36 millions of miles distant from it; is 329,639 times larger than it; and that this mighty orb itself and the planets for ever moving round it are held in their places by a modification of the same law that makes an apple fall to the ground. In natural philosophy and chemistry we need not dwell abstrusely on the laws and forces by which their phenomena are explained, but we might offer familiar examples, applying the principles of mechanics, pneumatics and hydrostatics to the necessities and usages of life; and we might shew how the arts of life go to illustrate and are illustrated by the beautiful science of chemistry. We might teach the proofs of design without entering into minute description of animal and vegetable structure; we might shew innumerable though familiar proofs of the adaptation of structure to function, and illustrate the ingenious cumulative argument for a first cause by disclosing the manner in which in animals and vegetables the organs destined for one particular purpose become modified according to the habits and necessities of families, genera and species. In natural history we have the wide field of the whole animate and inanimate structure of this planet open to our investigation: we might thence explain, without going into the profundity of the argument, that there was a time when there were no vegetable or animal existences on the earth, that there was another epoch when wonderful forms lived which do so no longer, though their skeletons are found in certain strata of her solid structure. The profound and ingenious reasoning by which the immortal Cuvier traced the habits of these extinct forms by the examination of their structure, and even shewed us the physical character of the climate they must have inhabited, might be made comprehensible, though a deep knowledge of comparative anatomy is necessary to a full understanding of the subject. The study of the natural history of the globe in its present state is a subject of itself that is quite inexhaustible, and we need never want objects in this branch of knowledge with which to instruct and interest the minds of men of the most ordinary capacity. The plains and the mountains are clothed with vegetable beauty and wonder—the air is filled with the buzz of insect life, incalculable in number and variety, the rivers swarm with endless modifications of piscatorial forms, and the fields and the woods are alive with the higher types of organization, reptiles, birds and quadrupeds in endless variety of form, habit and usefulness.

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* There is now a school instituted at Chelsea for the express purpose of furnishing schoolmasters to the army.

I anticipate that I may be considered enthusiastic and theoretical in supposing that the pleasures of knowledge and science would attract the interest and attention of the rough and ready and half-educated soldier. That very enthusiasm points out the attractive nature of such studies, and, if we may judge from the impressions they produce on our own minds, they must elevate thought, and plead for virtue in all who yield them attention.

In the detail of this kind of instruction much of course would depend upon individual manner and acquirement; but I am confident that the general working would be most beneficial to the morals and health of the soldiery. I feel a difficulty in conceiving that any man who had listened to a discourse on any one of the subjects I have touched upon, would go and make a beast of himself with drink; if he did so, he must feel that he was debasing his nature and his destiny, and that even on the mere selfish principle of animal enjoyment his conduct was most irrational. Real enjoyment is very different from over indulgence, and over indulgence soon brings even its own measure of enjoyment to a close. " And what exertions are more interesting and worthy a rational being than those which substitute vigor and health of body for agitation, tremor and pain—and serenity and cheerfulness of mind for horror, despondency and suicide."*

## A FEW REMARKS ON NATIVE HYGEINE.

To those who are acquainted with the social condition and habits of the natives, and who have read the foregoing practical remarks on hygeine, it will readily occur how much the sites of their houses, their accommodation, their diet, their clothing, &c. are opposed to full sanatory conditions.

It is far easier certainly to point out what is defective than to shew the means of correcting it. In our own climate the inhabitants of the country, or those who live in small hamlets, are usually exempted from many of the local sources of disease. Here it is not so to the same extent, for in every locality we have stagnant water and vegetable and animal substances in a state of decay, the whole at times exposed to the heat of a tropical sun. These local sources of disease, so apt to be overlooked from their familiarity and apparent insignificance, are, I suspect, productive of more disease and death than the great marshes and deltas of rivers, inasmuch as human beings are more constantly and in greater numbers exposed to their near influence. Dr. MacCulloch has well observed that we are yet unacquainted with the dose of malaria capable of producing fever, and that for all we know yet a dirty pool is as capable of producing it as the drying up side of a marsh—the quantity being the only difference. Dr. Fergusson goes farther than this, and says that even vegetation is unnecessary—soil into which water has oozed, and a subsequent hot sun, being all his theory requires. We may not dwell on this subject more at length here, but observe, with regard to the practical point, that filling up of all holes in which water collects,* draining as much as possible, and clearing away all rank vegetation and animal impurities, would beyond all question improve the health of native villages. In the large towns these measures are still more necessary, because the more men are congregated together the more apt is disease, even when not contagious, to appear among them.

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* Dr. Lettson.

In the large towns too the ventilation is especially bad, from the extreme narrowness of the streets, and, though the houses of most of the inhabitants may be better, this bad ventilation more than makes up the difference. Opening up wide thoroughfares through native towns is a certain and often a practicable means of improvement. With respect to accommodation we cannot hope to do much, except by the gradual improvement and civilization of the people. When a native gets rich, it is a common object of his ambition to build a good house, as far as his ideas of comfort go; good ventilation and strict cleanliness are not included; but if every European took the trouble to point out such matters to those natives with whom he himself came in contact, a considerable amount of good might be attained—a little improvement is better than none. How easy it is for instance for a man to point out to the numbers of servants about him how much they suffer from sleeping on the damp ground, the face covered up with a sheet not always of the purest white. The same remarks will apply to diet: the quantity of crude fruits and uncooked vegetables which the natives eat must be very injurious to their health. Few of them eat more than one cooked meal a day. The water of most native wells is to a certain extent impure: on this point they take no trouble—ditch water even they will drink, regardless of consequences. Surely the cleaning out of village wells might be enjoined by police rules. The dread of government interference, which is so constantly adduced as an obstacle to all improvement, it appears to me might be got over by judicious management and care on the part of the European functionary not to give too much authority to the native subordinates.

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* The material for this purpose may advantageously be procured by digging one large tank, which may be stocked with fish, and kept clean.

The poorer classes of the people suffer much from the want of clothing, being thus much exposed to the influence of sudden changes of temperature at all seasons; and in the cold season the mere effect of low temperature is often highly injurious. All natives in fact are careless on the subject of exposing the naked body to sudden extremes of heat and cold.

The practice of bathing at all hours, and without regard to the state of health, no doubt does much mischief. While noting down these sources of disease among natives, it strikes me that they cannot perhaps be fairly included under the head of hygeine, seeing that the means of prevention are absent. When the science of statistics becomes a part of the political government of this country, it will be very curious to trace how the particular occupations and professions influence health.

## NOTE TO CHAPTER THIRD.

### ON THE MARCHING AND ENCAMPING OF TROOPS.

The location of the camps of detachments, regiments and armies, is a matter of importance to which the foregoing general rules as to locality may be made applicable ; but since it is notorious that we cannot always detect the unhealthiness of sites by a mere optical inspection, (that generally a hurried one) the other suggestion I have to offer on this head should receive every attention. On routes where troops usually march, any site where they have suffered from attacks of disease should be carefully avoided on future occasions. This point is so important, that every unhealthy spot should be marked and recorded in the office of the Quarter Master General of the Army. This important recommendation is grounded on the acknowledged and permanent insalubrity of particular localities. With regard to fever and cholera particularly, half a mile or less would often make the difference. No season passes without our seeing accounts of corps being attacked on their line of march in particular parts of the country.

# CHAPTER IV.

## PREVAILING DISEASES.

In this last chapter I have the intention to offer the result of my own practical observation and experience of the causes, symptoms and treatment of the prevailing diseases, illustrating the same when it is necessary by the corresponding or opposing opinion of others. To treat so extensive a subject at length would require a separate volume for each important disease. A general sketch of the subjects is all that I propose to myself holding in view, chiefly what is useful and practical. The first division of the chapter will be devoted to fever, cholera and dysentery—the great prevailing diseases that both in military and civil life prove most destructive in this climate. In the second division I shall offer a brief account of the manner in which the climate affects the diseases of the three great organisms of the nervous, circulating, and nutritive systems. In a third division, and the last, the diseases of women and children, as modified by climate, will have a brief and practical consideration.

Division of the subject : *1st.* Fever, cholera and dysentery—*2nd.* Diseases of nervous circulating and nutritive functions—*3rd.* Diseases of women and children.

## DIVISION I.

### FEVER, CHOLERA AND DYSENTERY.

### SECTION I.

### FEVER.

Fever is a wonderfully prevalent disease on the plains of the Ganges, varying in type and character according to a variety of circumstances: locality, season, and individual peculiarity of constitution, are the chief modifying causes.

Prevalence and statistics of fever.

I have a return before me shewing the following facts with reference to the prevalence and mortality of fever among Her Majesty's troops in the Bengal command, for a period of seven consecutive years, from 1826 to 1832,* both inclusive. The average annual strength has been 8,700 ; the average annual number of cases of fever 4772 ; and the yearly amount of deaths on an average 132. The ratio of deaths by fever to those by other diseases during the whole seven years is as 928 to 2558. In the native army fever is of all diseases the most prevalent and fatal, for here dysentery yields to it. Mr. Edmonds, at page 439, volume 2, 1837-38, of the Lancet, gives a very interesting table, which shews among other things that of every hundred native soldiers 15,97 have fever during the year, and 0.27 per cent die of it ; in every hundred cases there are 1.70 deaths. In jails too it holds the next rank to bowel complaints in prevalence and in mortality. In the lower provinces, as shewn in table, No. 2, of Dr. Hutchinson's work on jails, out of an average strength for the year 1843 of 24,333 there were 10106 cases of fever and 290 deaths.

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* Having solicited and obtained the sanction of the late Governor General to be furnished with later information, I applied for but have not received it from the Secretary to the Medical Board.

In the upper provinces for the same years out of an average strength of 23,731 we have 14,159 admissions from fever and 493 deaths. Among the native population, as may be supposed from their social position and from their inattention to the sources and predisposing causes, fever is the disease which afflicts them most severely. We may separately consider, the causes, symptoms and treatment of intermittent, remittent, and continued fever, admitting here that occasionally there is a difficulty to which of the three to refer an individual case.

### SUB-SECTION—INTERMITTENT.

Intermittent causes of.

The train of diseased action known as an intermittent fever has by the consent of all observers been attributed to the effect of some exhalation from the soil; but, as mentioned in preceeding pages, the whole essentials involved in generating the poison are not yet fully understood, nor has chemistry yet discovered what substance or substances diffused in the atmosphere have the effect of causing an intermittent fever. It must be admitted that the sources of this kind of fever are extensive enough, whether we agree with the writers who suppose that marshes or wet soils are the producing sources, or with those who say that a dry surface that has been moist is the essential condition. At every season almost every part of the country has a portion of its surface in one or the other state, but of course the nearer such conditions exist to the habitations of men the more are they generally productive of the disease.* We know that in this country the most destructive malaria exists in situations

Sources.

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* In a work lately published by Mr. Serle and of which copies have been sent to all the Medical Officers of the Indian service by order of the Court of Directors, it is stated very positively that sulphuretted hydrogen is the cause of fever. I must be permitted to state that this is only one of a vast amount of assertions made in that publication which do not admit of proof. There is nothing it appears to me more injurious to the interests of our profession than to lay down positions which are not proved; and to reason upon them as if they were as unquestionably true as any of the laws in the exact sciences.

Jungles.

Jheels.

Pools and ditches in villages.

Drains about jails and barracks.

Question whether intermittents can arise from other sources.

where rank vegetation is present with imperfect ventilation to diffuse the generated poison : such are the Terai and other dense forests—the wooded ranges of low-lying hills, and the Sunderbunds ; but the rice jheels that are general over the country, and the lazy streams that are common in many parts of it, and even the dry ravines in the upper provinces are more productive of mischief, because they are more in the vicinity of the population. Nor can we doubt from observation the existence of nearer and therefore more prolific, sources of mischief than these, namely the half-dried ditches and pools in the heart of villages, the foul drains of jails, and the imperfect drainage and filth in the vicinity of barracks. That these are producing sources of malaria under certain circumstances we may not doubt, unless we believe that intermittent can be produced independently of that agent. This point we may briefly consider. It is a well known fact that persons who have once suffered from attacks of intermittent are liable to relapses in situations where the existence of malaria is impossible ; at sea for instance or at high elevations. Hence it is argued that an original attack may occur without malaria and the existence of the same train of symptoms in some cases of stricture is adduced in support of the same view of the subject. It is more curious than useful to pursue the enquiry and my space warns me to forbear. It is, however, certain that the usual, if not the only original, cause of idiopathic intermittent is undoubtedly malaria.

Predisposing causes of intermittent.

The influence of predisposing causes, their necessity we might say, to give effect to the remote cause of intermittent is well illustrated by the conditions of society in this country. At any of our stations for instance where we know it to prevail by witnessing its effects, those will escape who are not exposed to atmospherical vicissitude, to fatigue and exposure, or to mental anxiety ; to the disadvantage of poor diet, or bad clothing and accommodation. While the native population, the sepoys and the European soldiery are suffering severely, though in various degrees, it is nothing uncommon to see the higher classes perfectly exempt from sickness. As we might expect, when the poison is produced in larger quantity, or may be when its quality is more virulent, we shall find that the predisposing causes are less necessary to its action. In this way we explain how in some seasons and in some localities all classes become subdued. I have said in a former chapter that intermittent may and does exist in this climate at all seasons of the year, and I have hinted at the difficulty of explaining its exact affinity with the remittent form of fever, because it cannot be shown that the difference entirely depends upon the virulence or strength of the poison, whether such be caused by season or by locality. "Intermittent," says Mr. Martin, "has become a mild and infrequent disease in Calcutta among the better classes of Europeans—" and yet remittent continues to abide among them, and often proves very fatal. We see very severe intermittents, and read of those with a cold stage of 12 hours, and we often meet with remittents of the very mildest character. We are told too that the severer forms of remittent are apt to become continued. According to my observation the continued fever is usually the mildest we have to deal with in this climate; the remittent with sudden and severe paroxysmal exacerbation apt to run on to rapid collapse the most dangerous.* In cold countries we are told that intermittent, and it alone, results from exposure to malaria, and that as heat increases so do remittents become the prevailing form. Certainly such is not the rule without exceptions; for I have shewn the fearful prevalence in some years of remittents in our cold season, when the thermometer sinks to 40, and even lower during the night, though some assert that a continuous temperature above 60 is required for the development of malaria. As I have said elsewhere, we have intermittents at all seasons; they are least frequent in the middle of the cold weather and in the height of the rains.

Connexion and identity of intermittent with remittent.

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* Apparently the produce of the same cause, showing similar symptoms, and removed by the same means. There seems no difference between these two forms of disease, but their severity. Dr. Geddes's clinical illustrations of the diseases of India.
See page 107, volume 2nd, Good's study of medicine.

Description of a paroxysm.

The usual sequence of symptoms in a case of intermittent must be familiar enough to most Indian readers: they have felt it themselves, or seen it in others. The cold stage with headach; a dry, shrivelled skin and shivering; a low production of animal heat; a laboring pulse, anxiety and laborious breathing, with pent up secretions; the hot stage with a dry, hot, often flushed skin; headach still; a full, quickened pulse and still scanty secretions. In the last and sweating stage there is a gradual return to the normal condition of the various functions, the bursting out of perspiration being the prelude to these favorable changes. But the whole train of symptoms are not always present—a cold stage may not always be followed by a hot one; a hot fit may come on without a previous cold one, nor is it always followed by a sweating crisis. The true character of an intermittent then is that the attacks return at stated periods, leaving an interval when the patient is free from all symptoms of fever. Ingenious suggestions have been offered to explain the rationale of the symptoms, and in particular the reason of the periodicity; but as they amount but to conjecture, and we shall be able to cure intermittents very well without discussing them, it will perhaps be better to acknowledge that, though observation teaches us that these symptoms are caused by some terrestrial exhalation, we are ignorant how in this fever the poison acts, giving a cold, a hot and a sweating stage, succeeded by a total though temporary absence of all the symptoms. Equally ignorant are we why in a second series of cases the vital movements are differently affected, and, the periodicity being still marked, there is not as in the last case a total intermission; nor do we know a bit better why in a third set of cases there is a continued febrile movement with the absence of paroxysmal exacerbation.

Remarks on the proximate cause.

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[*] Headach is almost a constant symptom in the two first stages of intermittent—Dr. Geddes tells us it was present in 1006 out of 1210 cases.

Treatment.

In a paroxysm of intermittent the objects of treatment are to watch and counteract any serious tendency, to moderate the symptoms for the relief and comfort of the patient, and to place him as soon as possible in a condition favorable for the operation of medicines which will prevent a return. It is not always, when called to a case first, that the practitioner can tell which type of fever he has to deal with. This is of less consequence, as the treatment ought to be about the same in either case, if the symptoms are so too. We are to be guided by the symptoms present, our knowledge of the epidemic character of the season, and the peculiar constitution of the patient.

Serious tendency, a paroxysm.

Tendency to asthenia.

Tendency to coma.

The serious tendency I have spoken of may be a very reduced state of the circulation, threatening death by asthenia, or want of propelling power in the heart. This may be the effect of a state of the brain, such as exists in concussion from violence, or it may arise from a profound impression made on the great sympathetic nerve, or the organs it supplies, the functions of the brain in the last instance being little impaired. Another serious tendency in an individual paroxysm of fever may be determination to, or congestion of, blood in the brain—a vessel may give way, or the congestion may be so intense as to induce in that way symptoms of coma. In both instances death usually arises, not from the action of the heart ceasing, but by the respiration becoming seriously and at length completely suppressed. These are extreme cases to expect in the treatment of intermittent, but it is well to know that we may meet with them. In the threatening of death by asthenia with a weak, quick, fluttering and falling pulse, where the function of the brain is affected, marked by stupor and loss of voluntary power, it will be necessary to administer diffusible stimulants,* to restore if

Treatment in both cases.

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* The effect of the application of cold water in various ways to the head is a very curious subject, deserving of further enquiry. It is a powerful agent, at times producing a very depressing effect, at others appearing to possess great power in rousing the energies of the brain. I may refer to the lectures of Dr. Graves, of Dublin, and to a very interesting paper by the late Inspector Murray, published in the Madras Journal.

possible the heat of the surface, and to determine from the head by sinapisms to the feet and epigastrium. When the head is not affected, but the other symptoms of a failing circulation exist, a good dose of laudanum will act well. It soothes the great nervous commotion in the functions of organic life, which by sympathy are threatening to overpower the heart's action, but I do not usually prescribe laudanum in any stage of intermittent, for it interferes with other important indications of treatment.* The head symptoms, which are the effect of congestion, may present themselves either in the cold or the hot stage. The pulse, which is here more oppressed than weakened, will be our guide to depletion, giving consideration to the constitution of the patient. If we wish to relieve the head quickly, and the patient is robust and full blooded, we may use the lancet; under less urgent circumstances leeching and quick derivative purging will be enough. In the sweating stage should collapse be threatened, we may give nourishment, wine and diffusible stimulants, till the circulation and natural heat are restored.

Treatment to moderate symptoms in a paroxysm.

We next mention the treatment calculated to moderate the urgent symptoms, and to place our patient in the fittest condition for further treatment. Bleeding, free vomiting or purging, will all or one usually effect our purpose, by restoring the balance of the circulation, and liberating the secretions. Bleeding in the cold stage of intermittent I have tried. I object to it, because I believe it is far too heroic a measure as general treatment. It is seldom necessary; it has not been found effectual in preventing a return, and in a few cases it has produced alarming collapse. With reference to general and even local bleeding, we should not forget the sudden collapse that may come on in some cases of fever. With leeches judiciously ap-

Blood-letting.

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* I am aware that opium has been extensively used by Lind and others in the hot stage of intermittent. Its not being used at present is perhaps a fashion more than a reasonable result of experience. That it constipates and determines to the head are accepted facts in the profession.

plied, we can gain most objects of depletion by blood-letting in intermittent fever, and we can watch the effect with more safety. In all ordinary cases of intermittent during or after the paroxysm, all local determinations or congestions will yield to the judicious application of leeches. Emetics have often an excellent effect in the beginning of a paroxysm, especially two or three grains of tartar emetic, its effect kept up by free potations of tepid water. With natives this remedy is particularly effective, bringing the paroxysm to an early termination, and they themselves for some reason or other appear to approve of the treatment of disease by vomiting. Europeans dislike the treatment; and bearing in mind head determination, and the propriety of emulging the liver well before prescribing the specific, perhaps our best treatment is to determine to the surface by warmth externally applied, and by the free use of warm diluents, and when the hot stage is established to give mercurial purgatives in all ordinary cases where there is no necessity to guard against the effects of intense congestion. Dr. Jas. Johnson has well described how free purgation by relieving the portal system equalizes the general circulation. In most of the fevers of this country, as far as my observation extends, purging is borne well with little of that danger apprehended and known to ensue in some countries from ulceration of the internal coat of the intestines. It is the best general practice in the beginning of intermittent, in conjunction with draphoretics and diluents; it clears out the intestines, frees the viscera and the liver in particular, lowers the general tone of the system as much as necessary, and leaves our patient after the par-

Emetics.

Purgatives.

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* Common Aperient.

| | |
|---|---|
| Extract Colocynth, | 6 grs. |
| Calomel, | 4 ,, |
| Gamboge, | 1 ,, |

Make into two pills.

To be followed in 4 hours by a drachm of comp: julap powder.

Derivative purge.

| | |
|---|---|
| Calomel, | 4 grs. |
| Extract Colocynth, | 6 ,, |
| Croton Oil, | 1 drop. |

Make into two pills.

Many prefer giving 5 to 10 grains of calomel, following it in a few hours by senna and salts: infusion of senna 4 oz., salts 1 oz.; tincture julap 1 drachm, tincture senna compound 1 drachm.

oxysm is over in a fit state for the exhibition of quinine. In the sweating stage we need not interfere, except to encourage it till it is freely established. If it become too profuse, affecting the pulse and inducing other symptoms of weakness, we must counteract such threatenings in the usual manner. In return paroxysms, where we have previously purged freely, I usually, in addition to diluents and external heat, prescribe calomel and antimonial powder, to act on the skin, if the bowels are lax enough, or sulphate of magnesia, in combination with a small quantity of tartar emetic, if the bowels require to be acted upon. Having a complete intermission established, it is a fortunate circumstance that for so prevalent a disease we are possessed of a remedy which is one of the few that can be called specific; and the practitioners of the present day may well congratulate themselves that in the elegant preparation of the Sulphate of Quinine they possess the full power of the bark without the disadvantage of bulk, which so greatly interfered with the usefulness of the remedy. I am in the habit of giving it in ordinary cases in two grain doses every four hours, continuing these doses, if no fit returns, for three or four days, and then decreasing the quantity gradually. On the accession of a paroxysm, I relinquish the quinine for the period of its continuance, again to resume it, and probably in increased quantity, if the head has not been affected by it, and keeping the bowels regular with mild purgatives. Of course the quantity of quinine, and the manner of exhibiting it, may be suited to individual cases, and according to age, sex and temperament. Some give it in one large dose before the period of accession, but my own experience has led me to give it in the manner I have noticed, and I believe it is not prejudice but practical observation which has led me to leave it off during the existence of febrile symptoms. Willingly indeed would I be convinced that this invaluable medicine could be safely given in the paroxysm, especially in dangerous remittents. The manner of using quinine being here under consideration, I am re-

Treatment after the paroxysm.

Sulphate of Quinine.

Manner of prescribing.

Remarks on Mr. Hare's late pamphlet.

minded of having very lately perused a pamphlet by Mr. Assistant Surgeon Hare, entitled hints for an improved treatment of remittent fever and dysentery. Regarding fever (if the doctrines in that pamphlet be correct) the profession in India, and I as one of it, have been very blind and unobservant. In fever we have been watching, and in remittent with the feeling that life or death hung upon it, for the time when we could begin quinine. Now we are informed that waiting is in every point of view loss of time; that quinine may be given safely in the highest climax of fever; that it will prevent the congestions and complications which end in death.* I am no dogmatist myself—I know how even our powers of observation may deceive us, if we are travelling on a wrong track; but in this case I do feel a confidence that I have been right, where I would willingly believe and confess myself wrong, aware of the fatal course of remittents, and anxious to continue the quinine as long as possible in an intermission. I have in the first case felt my way with quinine to try as it were to stay the progress to death, and in the second I have given it up almost into the accession. Is it from prejudice I have come to the conclusion that if I did no harm I certainly did no good in either case? Dr. Hare's brochure will amply repay perusal, and it is but fair to state that he gives extracts to prove that quinine is now given in the bad remittents of America in immense doses, in the height of the paroxysm 30 to 80 grains; but I must say that he overstates the case as to the use at the present time of calomel, and the non-use of quinine, by the medical service in Bengal. As far as my own practice goes he assuredly does so, as will presently appear.†

Author's experience.

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* Mr. Hare's proposal is not original: a Monsieur Malliot is the original proposer of this system of treatment; and if Mr. Hare will look to the very first number of the India Journal of Medical Science, published in 1834, he will find Mr. Corbyn giving eight grains of quinine every four hours, without reference to the paroxysms.

† I may quote the following from myself, written ten years ago—"I cannot say that I have ever seen the sulphate of quinine of much use given with a hot skin, but in the marsh fever, when a

The use of quinine sometimes produces tightness of the chest, headach, flushing of the face, ringing of the ears, and even deafness. These symptoms, which are seldom of consequence, depend in part upon peculiarity of constitution, but we may remove or moderate them by leeching, purging and reducing the quantity of the medicine. Cases are occasionally met with where the disease will resist the full use of quinine. I have known bark in powder or decoction succeed in some such cases; and the solution of arsenic is a well known substitute, which I have often used with decided advantage. Though I have not tried it myself, I may here allude to the preference given by some to the common white arsenic. Such is the practice I am in the habit of pursuing, when the periodical return of the paroxysms, quotidian, tertian or quartan, is established for a time. Persons who have once suffered from intermittent are notoriously liable to returns by the slightest exposure to the known cause; and even the predisposing causes, such as getting wet, extreme fatigue, excesses in diet or drink, &c. will subject them to relapses. In such cases we must deal with the attack as before laid down, but to eradicate the disease change of air is essential—a sea-voyage of all changes the best, from which perhaps we may infer that even in the seizures of intermittent I am noticing terrestrial exhalations are operating in some degree.

Other remedies to prevent a paroxysm.

Change of air.

Repeated invasions of intermittent are apt to affect the general health in various ways, as might well be expected if we consider the great derangement which takes place in the nervous and circulating systems, and especially visceral engorgement in the cold stage, when the blood is congested in the great cavities, and the secretions suppressed. Experience displays to us that the spleen and the liver are the organs soonest affected—the first oftenest and most intensely, but

Sequela of intermittent.

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paroxysm is ended, it is our sheet anchor, and he who waits for a clean tongue on which to give it is in my opinion risking the life of his patient."

the derangements of the second are perhaps as important, for the functions of that great organ are more essential to those of nutrition. The mucous lining of the intestines or some of the glands in that intricate tissue are at other times affected by prolonged intermittent, and the brain and nervous system in general are occasionally particularly involved. In such cases, having to deal with a general disease and a local one, the difficulty of treatment is more than doubled—our practice must have in view the prevention of relapses of fever, and the cure of the particular local affection. It is here that change of air is almost indispensable; but, as it is not always it can be made available, we must at times look to the other resources of our art, nor must we forget that, with the avoidance of the predisposing causes, a very trifling change of locality will often act most beneficially. In these cases of intermittent complicated with local affection quinine is still our stand by against the periodic febrile movement. The treatment of local affections will be noticed elsewhere.

Manner of treating them.

Diet during and after intermittent.

On the subject of diet in the treatment and prevention of intermittent I have but a few observations. During a paroxysm the less food we give the better, and, if we require it to support the system, it should be of the blandest farinacious description; as long as the paroxysms are returning periodically I am still in the habit of giving only light vegetable food, because I have found by experience that the stomach cannot digest animal food. When I have fairly stopped the paroxysms, I gradually increase the diet; and in the prevention of intermittent I believe that a generous though temperate diet of food and wine has a salutary effect. I have elsewhere adduced, as an argument in support of this view, the great proclivity to fever of the poorly fed natives, and I may here add the known effect of all depressing agents.

### SUB-SECTION—REMITTENT AND CONTINUED FEVER.

I have to treat next of remittent and continued fevers, the most prevalent and fatal diseases we meet with in this climate, taking all classes of the population into account. Localities, particular season, and peculiarity of constitution, have all an influence over their character. In a well marked case of remittent there is no complete cessation of the febrile movement, but there is usually what is called the remission, or a temporary abatement, of the symptoms, and when they again increase this is called an exacerbation. In the continued fever this marked and periodic remission and accession are not so distinct, though I think they are seldom quite absent in our Indian fevers.

All our divisions of disease are however more or less arbitrary. Nature is not controlled by definition, and runs the character of fevers into one another. I shall have to shew that the worst fevers we meet with are those in which the paroxysm subsides almost into an intermission, that at other times the want of a periodic remission enhances their danger, and that often the mildest fevers we meet with may really be called of a continued character.

Authors on Indian diseases have usually divided fevers according to the season of the year at which they occur: thus the ardent fever of the hot weather—the bilious fever of the rains—and the congestive fever of the cold season. The first and last it is usual to call continued, and the second remittent, although all three may assuredly be produced by the same remote cause. This may be illustrated by the observed effect of exposure in localities (the forests of Singhboom for instance) where at all periods the miasmatic cause of fever is rife. In the hot months the fever caused will be marked more by dry, hot skin and high vascular action; in the rains paroxysmal exacerbations will be more marked; in the cold months the symptoms will be more those of congestion, with a lower state of vascular action, and less periodicity of character.

That heat alone, and especially solar exposure, may cause fever, independently of malaria, seems a fact admitted on all sides; but we shall often have difficulty in deciding (when fever is prevalent in the hot months) upon which of these causes the prevalence depends. I have elsewhere alluded to our defective knowledge of the whole conditions essential to the generation of malaria, and I have noticed the fact that it may undoubtedly emit from dry surfaces; nor are we to forget that showers frequently fall in the hot months, immediately followed by a hot and dry atmosphere endowed with wonderful evaporating power. It must also be remembered that in some parts of the country, even during the hot months, there are extensive surfaces which only then are becoming dried up. In these the ardent fever of the hot months will have some character in common with marsh fever, and in seasons when rain falls, according to my observation, the hot month fevers will be found to exhibit a periodic tendency even in the open localities where our cantonments and civil stations stand. This subject is interesting, but intricate. I have in the rains again seen fevers prevail extensively, but so mild in character, and with so little periodic accession, or decline of symptoms, that I have been inclined to assign them more to damp and climatic vicissitude than to the action of a specific poison; but during the rains, under other conditions of soil and atmosphere, and more particularly in the drying up months, we have the paroxysmal fever in varied phases of inflammatory, congestive and typhoid type.

With respect to localities where remittent prevails, we have already noticed in the 2nd chapter that there are some situations where the cause is existent and rife at all seasons of the year, if we except the cold season; and those who like myself have penetrated the dank solitudes of jungles prolific in vegetation and effluvia, will wonder that even in the cold season they are harmless, but so it is. I have lived for days in the heart of the forests of Tirhoot and Goruckpore, and have seldom even known a servant become affected. The whole of the great forest running along the foot of the Himalyah is known to be deadly from the middle of March till the same period of November. The valleys that skirt the opposite Vindhyan chain, and even the lower ranges of those hills, are noted for insalubrity; I believe even in the cold month some tracts of them are dangerous.

But rank vegetation, such as exists in the heart of all our districts, also produces malaria after it has got soaked with rain, and again begins to dry; and many facts that I have mentioned, and that are open to every man's observation, will prove that in particular seasons the causes of this fever are so prevalent that they affect all localities, while we are still justified in saying that dryness, cleanliness and free ventilation, are always to a certain extent protective. How much the character and prevalence of fever depends on the quality of soil is not fully understood. I have certainly observed that argillaceous or clayey soil favors the production, and the same is undoubtedly true (and to a greater extent) of what is called the black cotton soil. I have elsewhere noticed the mal-influence of ravines.

The division of our fevers into ardent, paroxysmal and continued, is practical, and, therefore, useful; and may be made partly without reference to season, because we may assuredly have either kind of fever at any season. It is nevertheless correct to say that each season stamps a character upon fevers.*

### SUB-SECTION—ARDENT FEVER.

Ardent fever, or the "febris causus" of some writers, is marked by symptoms of high vascular action, accruing suddenly, seldom preceded by rigor. The pulse is full, bounding and incompressible—the skin is hot and dry—the tongue is loaded with a white fur,† and the face is often flushed—thirst is urgent. This kind of fever is very often continued, and when remissions occur there is usually no clammy sweating or symptom of collapse. The headach is often intense and accompanied by throbbing, the delirium when present is not of the low muttering kind but of a more violent character, with an increased activity of the organs of sense; the secretions are suppressed more than vitiated; the whole vitality of the system is in a high condition, and we have few symptoms of the blood or its products being vitiated.

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* In the southern states of the Union there are no fevers in winter, at a season when there is no extent of damp and foggy soil exposed to a hot sun, and undergoing desiccation.—*Lyall's travels in America.*

† It is singular that Dr. Twining, in his general description of this fever, describes the tongue as having a brown coating; but, reading his cases, we shall see that the white fur prevails. When the brown coating is found, the fever will be less ardent, with more tendency to remission.

The complications are most commonly those of the head just noticed, increased vascularity of the aduata, headach, great heat of head, restlessness and delirium. Mr. Twining has noticed that a degree of stupor is often present in the earlier part of the disease; but we may also have separately or conjointly with the above or each other chest or abdominal complications. These will be of an active, inflammatory character, in contradistinction to the congestive and typhoid which the other kinds of fever often exhibit. In the chest we may have bronchitis, pneumonia or pleuritis marked by their separate and well-known symptoms. In the abdomen acute gastro-enterite inflammation and congestion of the liver or spleen, and of the mesentery and mesocolon, are the usual serious complications. The symptoms of the gastro-enterite are usually well marked, a red tongue, vomiting, irritable bowels and pain on pressure, with precordial anxiety and low delirium in the advanced periods. If the liver be involved we may have a sense of fulness or pain in the right side, torpid or vitiated biliary discharges, bilious urine, and sometimes a yellow suffusion of the skin. The congestions of the spleen, or behind the large and small intestines, are not marked by such prominent symptoms; but when we have fulness and discomfort of the abdomen, without the symptoms of the other complications just noticed, we may suspect the engorgement to be in the spleen, mesocolon or mysentery, or great congestion of the first-named organ. The pain complained of in the back may often proceed from this complication. The ardent type of fever is most prevalent and best marked in the newly arrived European, and during the dry hot months ; but at all periods and in all subjects the epidemics some seasons may shew a tendency to this type of fever more than to the typhoid, perhaps we may coin a word and say the collapsive or the congestive. Locality too has its influence, and the fevers of the upper provinces will usually have more of an ardent type than those of Bengal Proper, demanding a corresponding treatment, but of course all such remarks are comparative and to be taken with qualification. Holding this last observation in view, the fevers of the natives also have their share of this ardent character in the dry hot months, and at other times under some circumstances of season and locality. The causes of ardent fever are a high range of heat, undue exposure, violent exercise, sudden chills, and excesses in eating and drinking. Such being the causes that produce it, we may expect to meet it among the younger and least cautious, and chiefly in Europeans, the hard-working, exposed sailor in the Hooghly, the planters in the indigo districts, and the soldiers in barracks ; but natives are neither exempt from this fever in particular, and viewing it as unconnected with malaria ; nor are their attacks of marsh remittents at times unaccompanied by ardent symptoms.

### TREATMENT.

In proceeding to notice the treatment of this fever, I would wish to take the opportunity of offering a few observations on the general subject of treating fever, one that has engaged the attention of mankind for centuries, and yet remains to the present day the subject of keen discussion and diversified opinion. Some adopting a particular method, and pursuing it with heroic confidence, place every recovery to the account of their remedial measures ; and those who die are always supposed to have died of the disease—others less sanguine, but perhaps not more rational, tell us that medicine has little, if it has any, control over the mortality in fever. Mr. Martin gives us the opinion of the late Dr. Hennen, that the medicine expectante of the French, the mercury and the lancet of the English, and the rude and barbarous treatment of the Turks and Russians, had all an equal rate of mortality to shew in the remittent of the Mediterranean. Contrast this with the remarks of the late Mr. Twining appended to some of his fatal cases, to the effect that if more blood had been taken at such an hour, on such a day, the patient might have been saved. Now though I cannot credit the Mediterranean statement, even on the high authority of Dr. Hennen, considering that there must be some error of return, or some other way of accounting for it, the bare mention of such a belief on the part of a man like Dr. Hennen shews us with what humility we should contemplate our own knowledge in the practice of fever. This I ought to add is Mr. Martin's object in alluding to it.*

Remarks on treatment continued.

I am myself fully convinced that treatment based above all things upon experience and observation, and these grounded upon our knowledge of physiology and pathology, must and does prove useful in fever, and that to entertain a different opinion is not only almost high treason to the profession, but incorrect in itself.

Statistical proof.

In a statistical enquiry on fever by Dr. A. S. Thompson, published in the Edinburgh Medical and Surgical Journal for 1838, I find recorded as the 13th conclusion "that medical treatment has a powerful effect in lessening the danger and number of deaths from fever." I repeat that such is my own belief, but it should not make us too confident, especially in an individual case, as we may be sure that treatment kills as well as it cures some cases of fever. Hear this quotation from one who had treated fever in almost every quarter

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* I would call the reader's attention to a letter in the British and Foreign Medical Review, for January 1847, by a naval surgeon, page 265 : of 12 cases of the ardent fever of the Mediterranean, four were bled and purged, two died and one was invalided ; two had large doses of quinine from the first, one died and the other invalided ; two were first purged, and then had full doses of mercury, one died, one invalided ; two diaphoretics both recovered.

Dr. Fergusson's opinion.

of the globe. "There can be no treatment of fever by physic, but in studying the juvantiæ and lædantia of the case, cultivating the first, eschewing the last, and never forgetting that there is a mighty power always operating in your favor— the vis medicatrix naturæ." But as it is true that this same vis medicatrix does not always do the needful, the difficulty lies in when and how to offer her assistance. I am sure that he is likely to be the most successful practitioner in fever who bestows a keen solicitude in watching the symptoms of each individual case, with reference to their number, violence and progress, and the effect of remedies upon them. A strict attention is also necessary to all the minutiæ and auxiliaries of our prescriptions. We must ever remember too the rapidity with which disease runs its race in this climate, and that, in sporting language, if we do not make running too we shall often be distanced. It is for this reason that our visits should be frequent to bad cases of fever, and we should at each visit examine the condition of all the important organs as far as the means admit of.

Result of the author's experience.

Tendencies to death in ardent fever.

In this fever we have not to fear the death by low nervous depression as in typhus, or from collapse as in some cases of marsh remittent: the tendency to death is from over action. The substance of the brain may become so over-congested as to destroy its functions; death may arise by asthenia; but it will be more frequently by coma.* In such cases the vessels of the brain will be full and engorged, marked by increased redness over and especially between the surface of the convolutions. On cutting the substance of the brain more red specks than natural will be observed; and at a more advanced stage the morbid action will have caused effusion of serum into the ventricles, or more rarely the effusion will be found in other

And morbid appearance.

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* Mr. Twining, in his valuable work on the diseases of Bengal, gives some dissections of this fever, where the vessels were ruptured, and blood effused, with softening in the surrounding substance of the brain.

situations. Effusion in the head being fatal, it always produces death by coma, that is, while the heart continues to act, the function of respiration gradually ceases. In other cases the morbid appearances are confined more to those delicate textures lying between the surface of the brain and the dura mater, the pia mater, and the arachnoid; vascular injection, effusions of serum or even of lymph will be found; the mere elevation of the arachnoid from the brain is to be considered morbid, depending on the effusion of fluid. Should there be chest complications, the usual result from bronchitis, pneumonia or pleuritis will be exhibited, death arising by apnœa, the obstruction of the passage of oxygen into the blood, or by that kind of coma which is caused by non-oxygenated blood passing into the arterial circulation. And in the abdomen, too, we shall find in fatal cases marks of acute inflammatory action: the death may take place by the heart's action ceasing, or by coma first shewing itself.

### TREATMENT OF ARDENT FEVER.

Treatment of ardent fever.
General blood-letting.
Safe and advisable.

It is in this type of fever that we may use the lancet with the greatest freedom and safety; but I must yet express my conviction that even in this disease it is used too indiscriminately in Indian practice, because I have observed that blood-letting often produces a lasting injurious impression on Indian residents. New blood is not easily made, and it has appeared to me that there is an irritability of constitution and a tendency to local determination caused by the want of blood in proper quantity and quality. I am only arguing that there are many cases of ardent fever where general bleeding may be dispensed with. The inflammatory action or congestion is not the cause but the effect of the febrile movement, and the febrile symptoms may run high without their existence; but when these complications are present in the young, plethoric, and in the early stages of this fever, we may bleed freely and with an unflinching hand, always though with reference to the particular

Precautions offered.

constitution of our patient, for what is a large bleeding to one man is a small one to another. I believe that some cases of this ardent fever may be cut short by a free early bleeding, a consummation however more to be hoped for than expected: the usual effect is a relief of the more urgent symptoms, the fever still persisting.* We may repeat the bleeding in a few hours if the above effect has not been obtained. We must always be on our guard in cases where the patient has been exposed to the direct rays of the sun, or has been drinking, against a peculiar state of the brain thereby induced, in which bleeding is often fatal. The state of the pulse, of the skin, of the countenance, and of the intellectual faculties, will guide us in most cases.

Caution more necessary as the disease advances.

In more advanced stages of the case general depletion must be resorted to with more caution. It is then that we have to weigh circumstances in a very nice balance, feeling that we may kick the beam either way, whether we can venture more bleeding, (though we suspect dangerous action to be going on) or trust to other resources including the natural operations of the constitution. The effect of large bleedings I believe it must be admitted operates in disease beyond the temporary depression. In fever especially it would seem that the disturbance it creates may at times set up new and dangerous actions, bearing perhaps we may say a similitude to the state of the brain in the latter stages of typhus and in delirium tremens.

Leeching still admissible.

Leeching may be safely resorted to (applied to the locality chiefly affected) long after the lancet case should be kept in the pocket; and indeed by a regulated use of it almost every object of depletion is gained after the force of the circulation is subdued.† With respect however to leeching, also, we often

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* If, after the bowels are freely acted upon subsequent to the first bleeding, the symptoms are still violent, we should open the vein again.

† I have long been forced to the conclusion that these useful animals have a salutary effect beyond the mere quantity of blood they abstract, possibly through the nervous system, or perhaps by acting on the capillary circulation, in some way not quite under-

But its use also requires caution after a time.

Dangerous effects of over-depletion.

arrive at a point when we must remind ourselves of the acknowledged doctrine that large detractions of blood sometimes create a hurry and irregularity of the circulation, which is only increased by further depletion, acknowledging the difficulty of always distinguishing such cases, and particularly the difficulty of communicating to others how to distinguish them. I am confident that the doctrine, an undoubted true one, is not sufficiently recognized in practice.* I am myself induced to think that this state of the circulation, and the irritability of the nervous system which accompanies, leads sometimes to death, without more depletion ; and I further believe that in such cases sedatives would save the patient. To their use I am induced to think that in Indian practice there is an undue prejudice. Let us reflect how opium saves life in delirium tremens, and in some cases of typhus,—see pages 242 and 243, second edition of Dr. Twining's work.

### USE OF COLD WATER.

Cold affusion when admissible.

I allude to the use of cold water in this fever next, because the cold affusion is usually applied after bleeding. When we have reduced the force of the circulation, and the skin remains hot and dry, there is much recorded proof (and I have seen some myself) of the wonderful efficacy of this practice. I have had recourse to it in young, robust Europeans and Natives with good effect, but I must confess that I have not used it so much as perhaps I ought to have done, or as I feel inclined to recommend it to others. It is only the young and robust (and that in the early stage) that will give back the required re-action,

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stood. It is in some way like this perhaps we can explain why leeches applied to the integument relieve the viscus lying within, though there is no direct vascular communication between hem ; using relays of leeches often saves blood and keeps up their effect.

* This susceptibility to local congestion after excessive loss of blood I presume depends upon the want of that due balance which in a state of health subsists between the nervous and vascular systems.—*Cook's abridgement of Morgagni.*

Circumstances forbidding its use.

nor does it seem that it ever can be safe when visceral congestion or inflammation has been long established. In the last edition of Dr. Johnson's work, at page 170, there is a very remarkable case given by Mr. Martin, with reference to the present subject.

The sponging of the body with cold or tepid water, or with vinegar and water, is a measure in itself so comforting and soothing to the patient's feelings, that it should never be withheld; nor need we doubt that what is so grateful to the sufferer must exercise a beneficial effect beyond what is manifest in any immediate or marked change of symptoms.

Local application of cold.

The application of cold to the shaved head (if kept up without admitting of re-action, but with the effect of permanently lowering the temperature of the coverings of the head) is highly beneficial, and has an effect often on the circulation of the brain; in fact upon the general circulation. It is only by ice, however, or by constantly changing cloths dipped in freezing or cold mixtures, that this can be done; as cold is generally applied to the head it had better be left alone, but the proper use of it often amply repays the trouble. In delirium ferox I have seen the most wonderful effect from directing a stream of cold water on the head. It is a powerful remedy requiring to be watched.*

### PURGATIVES.

Purgatives—with what indications prescribed in ardent fever.

Free and brisk purging should never be omitted in the onset of any of our Indian fevers—certainly not in this one. We resort to it here, first to empty the intestines, and then for purposes of depletion and derivation from the head; according to my definition of the fever now under consideration, as distinguished from paroxysmal fever, (but we shall often see in practice how they run into one another) it is not so much an indication to purge with a view of altering the secretions. The sooner our first object is accomplished the better. These pills will act briskly and freely in three or four hours:

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* In Sir Geo. Ballingall's work there is a very good and encouraging account of the effects of the cold affusion.

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|---|---|
| Calomel, | 4 grs. |
| Extract Colocynth, | 6 ,, |
| Gum Gamboge, | 1 ,, |
| Croton Oil, | 1 drop. |

Make into two pills—may be followed in four hours by 1 drachm compound julap powder; but this will not often be necessary.

Our next purge may be given in six to twelve hours after the first has ceased acting: calomel 6 to 10 grains, with 4 of antimonial powder, succeeded in four hours by a drachm of compound powder of julap. Our best guide to continue purgatives will be the state of the tongue, the fulness of the abdomen, and above all the effect we see produced by them. I am persuaded that, when there is little for them to remove, they often do more harm by irritation than they do good by depletion. We may imagine that the intestines used to discharge their contents quietly once or twice in twenty-four hours stand some chance of being disturbed when they have ten or twelve hurried calls made upon them for days in succession. When it is necessary to continue the use of purgatives, they will be required in smaller doses—salts and senna in regulated doses secure every object.*

Guides for their continuance.

The bitartrate of antimony (whether we call it an emetic, a purgative, or a diaphoretic, and we can get either effect from it by management) is a most valuable medicine, for the reason that its dose can be regulated for the above effects, and because it is so elegant and tasteless a preparation. It will not be advisable to produce much vomiting, especially when the organs within the abdomen are much involved. To such cases indeed the tartar emetic is in all respects less suited than where the chest or

Tartar emetic.

Strongly recommended.

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* In the use of purgatives we must always bear in mind the chance of gastro-enterite arising, though it is not frequent in most of our Indian fevers—a tympanitic state of the abdomen, a red tongue and diarrhœa, are what we have to watch for. Dover's powder, compound powder of chalk, and sugar of lead, are the remedies, with local depletion when it can be borne. Dr. Duncan Stuart has described the tongue in some cases of this kind as rounded like that of a parrot.

head is affected. If we wish to empty the stomach, a dose of ipecacuanha will be better. After the use of a brisk purgative nausea is a chief object in the use of tartar emetic, because it lowers action. I have observed that the emetic effect is most common after the first few doses, without reference altogether to their strength, so that we had better begin with small doses at longer intervals, and increase one or both gradually.

Directions for its use.

| | |
|---|---|
| Bitartrate of antimony, | 2 grains. |
| Water, | 1 pint; |

two table spoonfuls at first once in four hours, 2nd dose after three hours, 3rd dose after two hours, and so continue; but we must judge of the effect on the individual case, and regulate accordingly. If we want to increase the purgative effect, the combination with sulphate of magnesia is excellent, and will give us what we should always have, without reference to the antiphlogestic effect of purgatives in fever, a daily action of the bowels. Enemata may at times be substituted—beyond the mere act of emptying the large intestines, they do little.

Enemata.

### MERCURY.

Mercury.

Mercury is used here either as a purgative known to act particularly upon the liver, or as a specific to check the consequence of inflammation, by or without the induction of ptyalism. On the first head, involving the question of stimulating an organ when it is inflamed or highly congested, I shall have to write elsewhere. I would here offer a few remarks on the use of mercury as a specific in the diseases of this climate. The first observation that suggests itself is how much of late years, and how gradually, medical opinion is changing and has changed as to the use of mercury. The days of single combat between a phial of calomel and a pucka fever,—and when an original thinker* (for proclaiming his belief and bringing forward figured proof to shew that the use of mercury could be and was abused) was suspended from his appointment and from the service,—those days have passed away, and perhaps they are now likely to be

General remarks on the use of in India.

Great change in opinion.

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* Dr. Halliday.

succeeded by a re-action the other way. Notwithstanding what was said by the late talented Sir James Annesley, that the practice of pouring in calomel till salivation arose, without reference to the state of the general symptoms, is an absurdity which does not merit refutation, it is quite true that such was almost the universal practice at one time; and even at the present time I believe mercury is prescribed day after day from a general impression of its influence over Indian diseases in general, and over the liver in particular, more than from a consideration of its particular action, and its suitableness to the individual case.* The number of recoveries after salivation takes place was no doubt the reason of the abuse of mercury. Late enquirers have put the question—did the patients recover because they were salivated, or did they become salivated because they recovered? was it post hoc or propter hoc? But they have not found it so easy to answer the question as to put it. Certain it is that the production of a sore mouth is a most difficult object to effect if we try to do so in a certain number of even healthy subjects in a given time. In fever it would seem that it is still more difficult to accomplish, and then the question arises can we have the good effect and the whole good effect of mercury in fever without salivation? I find other writers on our Indian diseases somewhat contradictory on this point—I mean those who have lately published. They tell us it is no object to salivate in ordinary cases, yet in other places they point out occasions where the only hope of saving the patient is by pushing mercury to salivation. One would suppose that if salivation is the mark of the specific and beneficial effect of mercury, it would be well to endeavour to arrive at this point in all cases. The truth would seem to be that practitioners are now aware they are fighting

Remarks of Sir James Annesley.

Author's opinion that it is still given without discretion.

Salivation.

Difficulty of producing it in fever.

Is it necessary to secure the good effect of mercury?

Opinions of other authors alluded to.

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* Let the reader peruse Dr. Fergusson's paper on syphilis, page 117 of his notes, and he will see how apt we all are to be deluded and illiberal when our opinions are confined, one-sided and dogmatic. I may add, in his language, "a stronger instance of the tenacity of the human mind in adherence to error never was exhibited," and I may apply it to the subject above noticed.

Reasons for the precautions they enjoin.

with a two-edged sword, which may cut for good or for evil. Short of salivation it makes a clean good cut by increasing the secretions and improving them: salivation is a stab in the dark, but in dangerous cases it is worth risking it: you may kill your enemy, (the fever, and its complication) but there is a chance you may have struck a blow at your friend, the vis medicatrix naturæ. Most writers on Indian diseases seem to hold to the opinion that, in dangerous cases where disease is running on to disorganize important organs, and after depletion has been carried as far as we can carry it, mercury pushed to salivation is the only chance of saving life; and certainly they have the argument of analogy in their favor. In inflammation of the lungs, in croup, in many chronic inflammations, it has been generally acceded that mercury induces a changed and salutary action—that change usually appearing when the mouth becomes affected. This has been ingeniously asserted to be an action of the capillaries, the reverse of that which disposes them to throw out lymph; but it is also true that we sometimes see mercury have the effect of filling up enormous solutions of continuity. In the effusion of lymph into the chambers of the eye, and its gradual absorption by ptyalism, we have ocular proof (a pun is not intended) of what mercury does in some cases.

Good reasons for their recommending ptyalism in dangerous cases.

Sir James Annesley on the effects of mercury.

Sir Jas. Annesley tells us he gives mercury for three purposes: 1st, to allay gastric irritation—2nd, to remove the tenacious secretions which in all cases of fever, according to him, adhere to the inner surface of the stomach and intestines—and, 3rdly, to improve and increase the secretions in general, and those of the liver in particular. All these indications he says can be obtained without producing salivation. As far as my experience goes, gastric irritation is certainly often and generally allayed by large doses of calomel, especially combined with opium. With regard to the tenacious secretions Sir James speaks of, and which he tells us calomel dissolves even in the dead body, I must confess that I have often suspected them to be produced, not merely to be carried away, by calomel; and they seem

Author's opinion.

Peculiar discharges produced by mercury.

Author's opinion that they are often mistaken for the products of disease.

to come partly from the liver; certainly discharges are seen after mercury, which never appear without its exhibition.* This is no proof of the non-efficacy of calomel, but it has often occurred to me that this appearence frequently leads to calomel being continued, under the idea that it is necessary to correct secretions which it is absolutely producing, without reference to other circumstances and symptoms. Nothing appears to me more worthy of further enquiry than the causes and sources of the varied discharges from the intestines in disease. I find the following observation on this head in a work by the late Dr. Abercromby: "It is probable that the bile may be increased in quantity, but it must at the same time be admitted that our prevailing notions on this subject are rather hypothetical than founded upon facts. The bile is a viscid fluid of a green color, and when it is mixed with the usual contents of the intestinal canal it imparts to them a bright yellow.† When the motions become of a dull white or ash color, we judge with tolerable precision of the deficiency of bile; but I am not aware of any test by which we can judge with precision of its redundancy, and I must confess my suspicion that the term bilious stools is often applied in a very vague manner to evacuations which merely consist of the feculent matter mixed with mucus from the intestinal membrane. On this subject I find a late intelligent writer on the diseases of India (Mr. Tytler) expressing himself in the following manner, after alluding to the doctrine of several systematic writers in regard to bilious diarrhœa, arising from increased secretion of bile: "not a single fact is

Quotation from Dr. Abercromby on the effects of bile on the stools.

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* I mean the peculiar green or greenish-yellow, viscid, oily-looking discharge so common after the use of calomel.

† Physiologists tell us that the bile is decomposed in the conversion of chyme into chyle, so that we may ask why its color does not alter according as the stomach is full or empty. I may ask another question—what becomes of the bile in cases of obstinate constipation, in persons for instance whose bowels only act once a week?

produced by either of these authors in support of their opinion, and it seems to rest merely upon the popular notion that the color of the fœces is derived from the bile, but this doctrine seems to be rather taken for granted than proved."

General remarks on the same subject.

Majendie and Alison assign the color of the effete matter to the bile, and the former alludes to his own and Sir Benjamin Brodie's experiments of tying the ductus choledocus in proof of this. The difficulties that have occurred to me are to account for the extraordinary changes that take place in these discharges: we shall see large fluid pultaceous evacuations, with no other sign of diseased liver; we shall in other cases have green spinach-like discharges—do we know the condition on which that depends? Again I have seen immense quantities of pitch black matter come away, with no knowledge, as far as I am aware, upon what specific condition of the liver or the rest of the apparatus it is dependent. To the subject of the above digression I shall have to return, in treating of the particular diseases of the abdomen; and I may now mention in what manner I am myself in the habit of prescribing mercury in the kind of fever we are considering. According to my view of the pure ardent fever, it is distinguished from the marsh remittent in that along with other differences—the secretions are not so depraved, less of dark biliary or mucous shreddy secretion, but in lieu yellow viscid discharges.* I give calomel, because I know it is an active purgative,† and because I believe,

Author's manner of administering mercury in ardent fever.

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* These various disordered secretions are attributed to disordered liver, but as far as my knowledge goes the particular morbid conditions have not been accurately and separately distinguished.

When we consider the amount of bile, mucus and food refuse discharged from the bowels of a fever patient in 24 hours, and compare it with what passes from a person in health, giving consideration to the changed diet, we must I think conclude either that there is a greatly increased secretion going on or perhaps that we purge too much.

† When there is vomiting, or great irritability of stomach, the twenty grain dose, combined with one or two grains of opium, has often an excellent effect.

though I am not quite sure, that it is a febrifuge, and that we may expect this effect from it when it brings away the viscid glairy discharges already mentioned. I give it usually in combination: antimonial powder four grains, and four grains calomel, twice a day or thrice assisted by purgatives. When the fever subsides I only give mercury, if bile is deficient in the evacuations; for I must here express my conviction, my knowledge against all theorists that in disease bile, if not pure, at any rate nearly so, passes off by the rectum, and I believe ought to do so unless fully employed in the process of chylification, and that even when it is employed in chylifying farinaceous diet its color will be retained in the evacuations. Such is the object with, and manner in, which I prescribe mercury in the general cases of this fever; but where there is reason to dread effusion in the brain, where there are high traces of inflammation in the lungs, or a threatening of abscess in the liver, or infiltration into other abdominal structures, I do not fail to try to push mercury to salivation, more especially at advanced stages, where blood-letting is no longer admissible. The rubbing in of blue ointment has always appeared to me the best and most likely way of effecting the object, but it may be combined with the internal exhibition of the mercury, blue pill or calomel, according to the state of the bowels. The twenty grain dose once or twice a day is a very good way of giving calomel. As this completes what I have to say of the exhibition of mercury in ardent fever, I may add here that in my own experience I have rarely seen the deplorable effects which are described by others to arise from the use of mercury pushed to salivation.* I am, therefore, inclined to think that it was excessive doses, or a long continuance of small ones keeping up prolonged ptyalism, which led to such melancholy results as we see recorded and alluded to; but I must add oftener the latter than the former, save where siphylis has been the disease

Remarks on the sequelæ of salivation.

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* The ill effect of salivation, when the spleen is affected, is unquestionable.

treated. I do not mean to deny that there are some constitutions on which mercury acts as a poison, or that its prolonged effect is not always injurious as we see in miners and others; but I believe they are much rarer than a mere reader in our profession would imagine. I am alluding to the sequelæ of salivation—its effect during fever, and how far it is answerable for fatal results, is a more difficult question.

Quotations from Dr. Sigmond.

In Dr. Sigmond's lecture on mercury I find the following, which I adduce in support of my own view that the bad effects of mercury are not so common as mere book readers would imagine. "Mercury improperly administered is the source of very considerable mischief, at the same time we must weigh well the different statements that have been made by various authors of the effects which it has produced. As Dr. Christison has very justly observed, if credit were given to all that has been written and is still maintained on this subject, almost every disease in the nosology might be enumerated among its secondary and chronic effects." In the lectures of Dr. Marshall Hall, his remarks on the effects of mercury will justify the opinion I have offered as to the difficulty of always being able to distinguish its peculiar operation in fever. I may quote one passage: "there is a great similarity between the erethismus mercurialis, and the effects of loss of blood; the extreme degree of chlorosis, and disease of the heart itself, in all the peculiar effect of sleep, and the proneness to sudden dissolution, are the same. The erethismus described by Mr. Pearson is not the only morbid effect of mercury. This remedy, instead of producing a kindly effect on the system, and on the disease, sometimes induces a quickened pulse with feverishness and general inquietude, a furred tongue, a harsh and intolerable feeling about the stomach and bowels, perhaps with sickness, perhaps with diarrhœa."

And Marshall Hall.

### SEDATIVES.

Fashions in medicine.

Prejudice against opium.

Author's opinion that it might be used more with great advantage.

Reasons for that opinion.

When indicated in ardent fever.

Beyond the general fashions in medicine which prevail over generations and countries, it is curious further to observe that there are fashions which are purely local. In the instance calling forth the present remarks, I believe it is owing to the high reputation of the late Mr. Twining as a practitioner, and to the authority which his work on the diseases of Bengal obtained in India, that opium, the queen of the sedatives, had long ceased to rule in the Indian hospitals. Here too a re-action is taking place, and I believe part at least of her kingdom is being restored to her. I shall shew elsewhere that I claim some share in this work of restoration (not a very fashionable one at the present time) as regards dysentery. I will here endeavour to shew that in the ardent as well as in other types of Indian fever, there are times and circumstances when we should not discard from our practice one of the most useful articles for the relief of human suffering that this bountiful earth by the bounty of its Creator produces. Referring to the usual authorities as to the general medicinal effects of opium, and to writers on fever as to the conditions of that disease in which it exercises surprising remedial powers, I may here refer particularly to Dr. Graves' Clinical Lectures,—see note to this chapter. I will state decidedly that in ardent and other fevers of this climate, as we might expect, states are present, where we can prescribe opium with the greatest benefit and success. In ardent fever it is indicated when after free depletion there is great restlessness, even in some cases when accompanied by delirium, and especially when under the same circumstances the want of sleep is a prominent symptom.*

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* In all cases of fever it is highly important to watch well the minute symptoms. For instance the patient lying only on his back, and sliding towards the foot of his bed, and picking the bed clothes, are always significant of danger ; so is it also ominous when a patient falls into a state of composed listlessness approaching to stupor after high excitement.

Here it will often save the patient's life, and I believe it will do so when no other medicine will do it. If we make up our minds to prescribe it, it must not be in small doses—a full dose of 2 or 3 grains must be given, aye and it must be repeated, till we gain our object, unless it increases the heat of head, and the frequency of the pulse, or manifestly increases the delirium, if that symptom be present. In this last instance I have often seen marked relief from the counter-action of cold to the head, or by the application of a very few leeches. The late talented and lamented Dr. John Mackintosh, of Edinburgh, well observed in his excellent work on the practice of physic, that he will deserve much of the profession and of mankind who can teach us always to distinguish between the disturbed function in the brain, which is a symptom of a deranged and irregular circulation in the organ, and that which is caused by a subacute inflammation. No doubt it is this difficulty which has brought opium into discredit in the fevers of this country; and it is for the same reason that Dr. Graves, of Dublin, has substituted the treatment of opium in combination with tartar emetic* in some cases of head affection in fever, and opium alone by enema in others. Of these remedies I cannot speak from an extensive use, but the trials I have made have been highly satisfactory, and the general principle on which they recommend themselves I am sure is correct.

Manner of giving it.

Caution required, as well laid down by the late Dr. John Mackintosh.

Way of exhibiting it advised by Dr. Graves, of Dublin.

No man of experience I am satisfied will deny that in this ardent fever, as in others, there are at times, particularly in prolonged cases that run into a low state, head symptoms to which none of the remedies before mentioned will be found applicable. It is for these that opium comes to our rescue. I acknowledge the difficulty of defining them, and I know that it is easier to

When useful, according to author's experience.

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|---|---|
| * Bitartrate antimony, | 4 grains. |
| Tincture opii, | 1 drachm. |
| Camphor mixture, | 8 ounces. |

A table spoonful every hour or two hours according to urgency. This mixture often allays delirium and nervous tremors, and puts the patient for days sleepless into sound repose.

recognize them in practice than to describe them in writing; but it is one point gained if I shall be the means of calling more attention to them, supposing it true as I believe that at present they are not sufficiently recognized with reference to opium as their remedy. I may further observe on this subject that after a good deal of experience in the use of opium, and from my knowledge of its use in the fevers of Europe, I feel myself justified in saying that the stimulant effect of opium will not often arise. Coma and death are effects often attributed to opium, but I believe much oftener than it deserves, because the cases in which it is useful usually perish by coma, and might do so without its exhibition.* Hyoscyamus is a sedative much more uncertain in its effects, and I have confined its use in fevers to cases where I wish to soothe the intestinal canal without producing constipation.

Hyoscyamus in what cases used by the author.

Quinine when and how given in ardent fever.

*Quinine.*—I make it a rule to give quinine in all fevers after the febrile symptoms are gone. As already hinted at, we may in this fever, notwithstanding its usually continued character, have at times decided remissions and exacerbations. When the remission is well marked, and the complications are not serious, quinine may be given; but we may here wait more for almost if not for complete aperexia; and I believe it is also correct to say that it is more apt to bring on heat and local determination, if given in this fever too soon, than in regular marsh fever, but there is not so much necessity for using it, and it may be given in smaller doses.

Practical remarks.

DIET.

Diet recommended.

In ardent fever for the first few days the less food given the better, and it should consist of nothing but the most bland farinacea; even absolute starvation may be advisable for two or even

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* You will sometimes find a state resembling delirium tremens left after the subsidence of acute inflammation of the parts with the cranium, and requiring the treatment of delirium tremens.—*Watson's lectures.* Dr. Watson might I think have added, this state is particularly apt to arise in those addicted to the use of spirits.

Too long starvation not recommended.

three days, but after that we must give some nourishment, recollecting that the want of it is after a time apt to excite constitutional disturbance, and even a 'sub-acute inflammation of the primaeviæ.* The return to more generous diet should be exceedingly gradual. I am not in the habit of limiting the patient's drink during this fever—iced water and cold acidulated drinks I consider very beneficial, unless there be particular symptoms to contra-indicate their use.

Diet during convalescence.

Blisters are indicated in ardent fever after depletion to remove local inflammation, and sometimes there is nothing else that will save a patient passing into profound coma to end in effusion and death. The blister should in such a case cover the scalp like a night-cap.

Saltpetre highly recommended in ardent fever.

I had almost left unnoticed a remedy which I have found very useful in fever, particularly in this form of it: I allude to the nitrate of potass, and I believe it is hardly used in the Indian hospitals. In combination especially with tartar emetic there are few medicines more suitable to this fever. I owe the use of this medicine to the perusal of Dr. Graves' lectures, and I strongly recommend it to others. Two or three drachms may be given in twenty-four hours in doses from 5 to 10 grains or more at a time.

### SUB-SECTION—PAROXYSMAL REMITTENT.

The paroxysmal remittent fever is that which is more especially met with in localities where miasmatic exhalations are powerful and concentrated. It is known under the name of jungle fever, and in a very violent form, when individuals or regiments are exposed in the hot months or rains in the heart of deep forests. Some of my readers will remember when so many officers and men of the 38th Native Infantry fell victims to the virulent poison of the forests of Singbhoom : among the former was the Surgeon, Mr. Jas. Macra,* a man of herculean frame, and very temperate habits. Individual instances of the effects of exposure to jungle poison are constantly occurring : the adventurous grantees in the Sunderbunds ; the tiger hunter, who goes late into the forest ; the fisher in the rivers of the Dhoon, or in the streams among the valleys in the hills ; and the enthusiastic missionary pursuing his calling, regardless of bodily ill or discomfort, cheered by his sense of a high duty, he forgets mere human considerations ;—all these are exposed to the attack of jungle fever, acknowledged as the most severe kind of paroxysmal or bilious remittent. But neither are the daily and hourly haunts of men in this country except always from severe visitations of this fever. If the reader refers to the works of Johnson, Twining, Martin and others, he will see that it dwells in the heart of the City of Palaces ; and I have shewn in the chapter on climate that it is endemic in numerous localities in every district, and that in some years it spreads itself into a wide epidemic over the whole face of the country. In other seasons particular parts of the country only have the epidemic visitation. In the same chapter I endeavoured to shew that these outbreaks in the cultivated and inhabited parts of the country would usually be found to accompany extreme conditions either of inundation or of drought, particularly when such occurred at periods of the year when the alternations of temperature were sudden ; and that in some seasons this last cause existed in a higher degree than in others. But on whatever cause dependent, whether on local and physical conditions of soil and atmosphere, or a general epidemic constitution of the latter, I impressed the important truth ; and I repeat it here that local purification, and the avoidance of the predisposing causes,

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* Mr. Twining states that in the very advanced stage of the most dangerous cases of this fever half a pint of thin gruel in twenty-four hours is sufficient nourishment—see page 595, 1st edition. I feel confident that this may be called dangerous starvation.

Prevails always in jungles—fatality in 38th N. I.

Individuals liable to jungle fever.

Nearer sources of paroxysmal remittent in Calcutta.

In other parts of the country.

Causes influencing its prevalence.

Means of prevention and avoidance.

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* Long years have passed since the above event occurred, yet does my memory dwell on the individual whose name I have mentioned with sentiments of strong regret and esteem. Time and circumstances rub down the keen edge of our feelings, and perhaps this is the reason why early friendships cling so fondly to memory.

will keep us generally exempt. In Calcutta it would appear that even the higher classes of society, inhabiting the splendid three-storied palaces of Chowringhee, do not escape; and in the account of the epidemic at this station in 1816, which I gave in the 2nd chapter, it was seen that rich and poor were said to suffer alike. The fact with reference even to Calcutta is only true, I am sure, in seasons of great sickness. The highly malignant fevers which I described as so fatal at Mynpoorie, Moradabad and Bareilly, did not affect a single European; and we have constantly to remark the same fact at every station—but if European troops be a part of the community, they will suffer because their habits and social position predispose them. While the ardent fever we have lately had under notice is not subject to much variation of character, this paroxysmal fever has great changes of epidemic type, much—but not by any means all—of it depending on the season of the year—the inflammatory type most common in the hot weather; the congestive in the rains, and in ordinary seasons in the drying up months; and the typhoid type in unfavorable seasons at the breaking up of the rains, and sometimes in the cold weather. The symptoms of the inflammatory form of remittent do not differ materially from those of the ardent fever last described; perhaps they are longer preceded by a marked condition of malaise, and oftener ushered in by rigor; the paroxysmal exacerbation and remission are usually more marked with a corresponding effect on the organs particularly involved; and the remission is usually followed by more or less sweating. The time of accession may vary much, though the morning and towards night are the most common periods.

Occasions when its influence is intense.

Varied types of paroxysmal remittent.

Inflammatory, congestive and typhoid.

Symptoms of inflammatory paroxysmal.

Symptoms described.

The pulse is full and strong; the tongue dry, with a white or brownish fur; the symptoms of bilious derangement are more marked than in ardent fever; bilious vomiting more common, and the discharges in the other direction more bilious and profuse; the other abdominal complications are more prominent, and are those of congestion more than of inflammation;

the head symptoms are less acute, and the chest symptoms more frequently absent altogether.* In the remissions there is more tendency to a moist skin than we find in the ardent fever, and much less to profuse sweating than in the congestive form of the remittent about to be noticed. In the congestive remittent there is less vascular action and heat of skin during the paroxysm, but even more precordial anxiety; the pulse not so full and incompressible, but more hurried, irritable and jerking; the skin is less dry and parched; the tongue more clammy, the abdominal congestion is more marked, and the secretions more vitiated, green, flocculent or pitchy; the countenance shows more anxiety and depression; the paroxysm and remission are more distinct, and the cold clammy sweat in the latter is sometimes apt to run into collapse. In this type of fever too there is occasionally grumous vomiting, and it is here too that yellow suffusion of the skin is usually so deadly a sign. In the typhoid form of remittent there is from the first a comparatively low tone of action, with a depression of the powers of life, not to be accounted for by the endurance or severity of the symptoms; the paroxysmal reaction is feeble: occasional chills and slight sweatings; the countenance much depressed; the delirium more muttering than fierce;† the tongue has a dry dark fur, and trembles on protrusion; the gums often covered with sordes, and the secretions are highly vitiated, the blood itself appearing black, and not coagulating well. The yellow suffusion is here too often present, and at times a greenish tint is observable. Such is an imperfect sketch of the three most prominent types of remittent. Of course they often run more into each other than I have been able to de-

Symptoms of congestive paroxysmal.

Symptoms of typhoid paroxysmal.

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* Mr. Twining in his account of remittent mentions vascular engorgement of the depending part of the lung as a common appearance after death, and has associated it with effusion at the base of the brain and in the spinal marrow.

† It is here we shall meet with what is called the ferret eye, when the head is seriously involved in congestion or sub-acute inflammation.

The foregoing division considered useful.

Though all cases will not come distinctly under either.

scribe, and one case may assume each form conspicuously at different periods. One must draw the portrait with broad lines, in order that the likeness can be recognised in reading; the finer touches must be put in at the bed-side; still I think there is advantage in making sub-divisions, because it goes as a guide to treatment. The practical man must know well that there are mild cases of remittent, the symptoms of which will not amount in degree to an equality with any of the descriptions I have given, and yet have some features in common with one or all of them. The remote cause of this fever has been already mentioned: I need, therefore, here only notice how other circumstances influence it. The inflammatory form is most common in the hot months, and in those of a high tone of constitution; the congestive we meet with in all its shades after the rainy season has made a general lowering impression on the health of the community; and the collapsive phase of the congestive would appear to be confined to some particular seasons. The low typhoid form is met with in the ill-fed, ill-accommodated and ill-clothed, who under much fatigue are exposed to the remote cause in the worst localities; but we must also acknowledge that there are seasons when there is a general epidemic influence giving fever a typhoid character; and this is true whether we are to consider fevers such as those I have shewn to prevail in the upper provinces in the cold weather as remittent or continued.

Remote cause of paroxysmal circumstances which influence it.

### PRE-DISPOSING CAUSES.

Predisposing causes.

The predisposing causes of remittent are all such as depress the vital powers, and place individuals in a state of physical discomfort: excessive fatigue, impoverished diet, exposure to wet or to extreme changes of temperature, residence in crowded ill-ventilated localities; all these make the system more liable to be affected by the direct cause. The well-observed fact that night exposure is more dangerous in affected places than exposure during the day ought not to be left unnoticed here, because those who have to pass through jungles* should always do so during the day if possible—morning and evening are especially dangerous. Even in our stations and cantonments night exposure is as well avoided at certain seasons. The night fogs in Calcutta are well charged with miasm. It may be useful to offer a brief view of the tendency and progress to death in the several forms of remittent mentioned. And first of the inflammatory. The high vascular action will induce us to expect the products of inflammation or of intense and active congestion in any of the three great cavities—of the head, chest or abdomen; and though we shall usually find such appearances on dissection, it will not always be so; for here (even as in typhus) the remote cause may undoubtedly act fatally on the organism without leaving traces that can be discovered. When the head is chiefly affected, delirium, restlessness, headache, throbbing carotids, and great heat of forehead, will teach us the complication, and prepare us to find congestion and effusions on the surface or in the ventricles of the brain after death. Death takes place by coma, or it may be complicated with death by asthenia, that is to say stupor advancing, the pulse gradually fails at the same time. When coma comes on by effusion into the ventricles, it may cause death while the heart's action continues. We may imagine that the heart would go on to act, but that respiration ceasing it ceases to receive its proper stimulus. We shall have reason to fear that death will arise from the head, if in each paroxysm the head symptoms are becoming more violent, and are succeeded by a tendency to stupor.† The chest complications in inflammatory remittent I

Tendency to death in the three forms of paroxysmal fever and morbid appearances.

Inflammatory.

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* In all cases where a person is exposed to high malarious influence the moderate use of quinine is a good precaution, nor is the use of a gauze veil or musquito curtains unworthy of notice.

† I have not dwelt on the occasional symptoms attendant upon head affection, such as twitching of the tendons, convulsions, picking of the bed clothes, &c. Even in purely idiopathic diseases of the brain, the ablest pathologists have not been able to associate them with specific morbid conditions. In fever this is even more true, but they are always to be considered as enhancing the danger.

have not often met with. Those who have a practical knowledge of the use of the stethescope, will have a great advantage in the ability to detect them.* They will, when fatal, cause death by asphyxia or apnœa.

The abdominal complications in the inflammatory remittent leave congestion of the liver almost amounting to softening, infiltrations in the doublings of the peritoneum, engorged spleen, and sometimes the mucous lining of the stomach is inflamed. Death occurs by asthenia or by coma as the effect of these lesions, but it is not easy to explain how it arises. The effect on the action of the heart, of violent inflammation in the abdomen, has long been recognised, and it is perhaps the prolonged action of the same sympathy that proves fatal in the case under discussion. How coma is produced by abdominal lesion is a more difficult question. The fact is certain that in many diseases of the abdomen the head becomes fatally, though sympathetically, affected. With regard to the tendency to death† in the congestive form of remittent, it is only necessary to add to what has been stated above that death seems sometimes to arise suddenly and by asthenia, independent of organic lesion. Mr. Martin has well compared this profound impression to the effect of a blow on the pit of the stomach. In some cases death arises without any symptom of coma, simply by the heart's action ceasing as in some cases of cholera. In the typhoid remittent blood more or less vitiated is passing into all the organs and tissues. The heart appears early to want its proper stimulus, but death will arise by coma, asthenia or apnœa, according to the organ in which the profound congestion arises earliest. Coma is the most common cause of death, for, besides head

Congestive.

Typhoid.

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* To form accurate conclusions with the stethescope requires in some cases a very fine sense of hearing, added to a practical knowledge of the use of the instrument, and the habit of reasoning upon the deductions to be drawn from the signs of the breath, voice and stroke sounds, all considered together.

† As Mr. Twining has well observed, there are two periods when death is principally threatened in remittent: at the climax of the paroxysm, or when the remission is fully established.

congestions, it is the most common effect of the intestinal inflammation passing at times to ulceration so common in typhoid cases. Often, however, the circulation is greatly overpowered at the same time. The observations which I offered when treating of ardent fever on the various remedial means at our disposal, will enable me here to confine myself to a detail of what I have found the best and safest manner of using them in the various forms of remittent.

## TREATMENT OF INFLAMMATORY, REMITTENT, OR PAROXYSMAL

### BLOOD-LETTING.

Treatment of inflammatory, paroxysmal, general blood-letting.

Good effects of.

Precautions and directions.

Leeches always advisable.

This used early and freely not only lessens the chance of dangerous lesions, but it enhances the probability of the remission becoming more distinct, thus admitting of our putting a stop to the disease by the use of quinine. It is true that leeches will sufficiently meet the reaction in many cases; but if it is a highly marked case in what we know to be a bad epidemic, yet bearing bleeding well we should never omit one good full bleeding early in the case. Though in this variety of the fever there is usually, as far as my experience goes, not much danger from collapse after bleeding, it is as well to enjoin the operation being performed early in the paroxysm, and never with a moist skin. The precaution offered by Mr. Twining always to bleed in the horizontal posture is good, and his reason for it that the indication of syncope is never desirable. When we have an opportunity of watching the state of our patient after the intensity of a paroxysm has subsided, it will give us a better guide to the quantity of bleeding he will bear than we can obtain by the violence of the reaction. We must bleed in every respect more guardedly and observingly than in ardent fever, and after the first day or two the use of the lancet is almost always inadmissible, even in this the inflammatory remittent. Leeches are always advisable, even when the complications are moderate in degree, and particularly when the exacerbations and remissions are well marked (which is not always the case); for this shews us more than any thing that we have to deal with

Directions for their use.

a marsh fever the issue of which is always more or less uncertain. Many enjoin that even leeches should not be applied during a remission. I believe this to be erroneous advice as a general rule, for in some cases they are quite admissible, will do more good to the local affection, and will go to moderate the violence of the next paroxysm. I have only to add that leeches cautiously used may often be useful in advanced periods, particularly where we have been able to improve the patient's condition by the exhibition of quinine.

### PURGATIVES.

Purgatives. Indications.

Precautions.

Purgatives are indicated to relieve the fulness of the portal system, to improve the secretions, and their exhibition is always necessary previous to the use of quinine. Even in this type of remittent, however, I consider it necessary to watch their effect after the first day or two on the heart's action. The diseased state of the abdominal viscera makes it necessary to watch the impression made on the general circulation by any thing affecting their condition. It is in the present state of our knowledge always well that calomel or blue pill should form part of our purgative treatment, as it is considered to act on the liver, and to improve the secretions generally. There are some who dispute the effect of mercury on the action of the liver, but I believe the great bulk of opinion is as I have stated it. Purgatives should always, if possible, be made to act during the paroxysm.

Combination of mercurials with other purgatives recommended.

### TARTAR EMETIC.

Tartar emetic not recommended in cases of abdominal complication, but very useful when head or chest involved.

It is not I think advisable to administer tartar emetic in the cases of this fever, where the organs in the abdomen are chiefly affected. When the head or chest is principally involved, it is only second to bleeding, for the purpose of moderating vascular action.

### MERCURY.

Mercury.

Use of in this fever.

Reasons for pushing it to ptyalism.

Dr. Johnson's opinion of its use in this fever not fully borne out by modern experience.

Advantage sometimes of the twenty-grain dose.

I know not that I have much to add here to the general observations I have already offered on the use of mercury. Those who think as I do of its powers will prescribe it cautiously, but steadily, to lower action, and to improve secretion if the spleen be not diseased; and in cases of danger that do not yield to depletion, pursued to the limits of safety, they will try to excite ptyalism, but they will often fail. The most urgent case for its use is that pointed out very clearly by Mr. Martin, where the remissions cease to be distinct, and the urgent symptoms persist or increase in violence: we have no hope of gaining time by the use of quinine, and our patient is hurrying to death by effusion into some of the cavities. Reading the cases in the work of Dr. Jas. Johnson, one would suppose that, after bleeding, in mercury we had a specific against remittent, and that to excite ptyalism was an easy matter, and always the haven of safety. Present experience will not warrant us in saying that either circumstance is the rule now without very many exceptions.* I again allude here to the great sedative and soothing power of the twenty-grain dose of calomel in cases of precordial anxiety and gastric irritation: given in this way, too, in bad cases we gain two other objects of its use—by remaining it will have more effect in improving the secretions, and as part of it is more likely to be absorbed we are perhaps coming nearer its specific effect than by giving small purging doses occasionally. It is, however, a curious circumstance noticed by Sir James Annesley and others that a night dose of twenty grains followed by a purgative next morning may be given long without producing ptyalism. When we wish to salivate quickly, rubbing in should never be omitted.

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* After the remarks I have made elsewhere, it appears scarcely necessary to observe that I am aware of the possibility and even likelihood that our present fevers are not in all respects the same as those Dr. Johnson had to deal with.

### QUININE.

Quinine in paroxysmal fever the key-stone of cure.

Giving consideration to the paroxysmal character of this fever, and to the power of quinine in so many cases to prevent a return, we must assuredly consider its exhibition as by far the most important part of our remedial measures; bleeding, purging, &c. are but clearing the way for the foundation to lay this the key-stone of the cure. Mr. Twining well observed that in many cases to avert a paroxysm is to save from death. Such being the power of the weapon we wield, it would be well if we could always strike with it; but it is unfortunately the case that there are instances and periods of this fever when quinine not only does no good but appears decidedly to hurry the febrile movement, and to add to the gravity of the local affections. This brings me again to notice Mr. Hare's pamphlet, wherein he advises the use of quinine from the outset of remittents. If this proposition shall be acted upon, and found to succeed, a great object in the practice of Indian medicine will have been obtained. I quote the following from a work very often referred to in these pages: it will not only be seen to coincide with my views, but it will shew that practitioners have not been so tardy in giving the quinine as Mr. Hare would lead his readers to suppose—"where the remissions on the other hand are well marked quinine should be given in full doses, without waiting for every thing. Some practitioners recommend that before this drug is used we obtain previously a clean tongue, natural secretions, and the absence of all heat of skin or local affection. I believe this to be a dangerous practice. If we are to wait for every thing we shall often wait too long, or till it is too late. I have always administered quinine in the more favorable cases now stated, in disregard of certain local abdominal affections, (those of the head should in general exclude it) believing that, if I arrest the paroxysm, I do greatly more good to the system at large, than quinine can possibly do harm to the local affection, the treat

Instances and periods however when it cannot be used.

Remarks on Mr. Hare's suggestion regarding the exhibition of quinine.

Opinion of Mr. Martin on the same subject.

ment of which by local depletion is not interfered with by this means. Again, all tenderness on pressure, or local pain, does not in the case here stated constitute inflammation." For the use of quinine in inflammatory intermittent I know not that better or more specific rules could be laid down than the above extract from Mr. Martin's work contains; our acquaintance with the individual case will teach how much time we have for the use of quinine. If it be short, and the necessity urgent, the doses must be large, and repeated at short intervals. I have not come to the immense doses of the Americans, but I have given ten-grain doses every four or five hours; this is about double what will suffice in ordinary cases. It is a highly practical observation of Mr. Twining's, that, even if the exacerbation should come on again, we have often gained something, and may deplete more if the symptoms require it. Having succeeded in averting the paroxysm, we must continue the quinine for days, attending to the other conditions of a patient convalescing from a violent disease. If a paroxysm should again occur I leave off the quinine, treat the new state of things according to the symptoms, and watch assiduously for the time when I can recommence the anti-paroxysmal.* The combination of quinine with calomel, or with sulphate of magnesia, as I think first suggested by Dr. Macgregor, I have found useful in some cases where it was doubtful whether it would not otherwise increase the heat and other febrile symptoms.

Directions from the author's experience.

Combination with calomel or sulphate of magnesia.

*Sedatives.* I believe that opium and henbane will often be found useful under conditions similar to those mentioned as indicating their use in ardent fever. I may here particularly notice how useful they may be (and opium more especially) in abdominal determination, on the principle so lucidly laid down in the following extract—"That opium is an important and

Sedatives recommended in abdominal complications—quotation from Alison.

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* In a case where, from the effect of the last, we may apprehend danger from the return of another paroxysm, perhaps we ought to give quinine at all hazards.

valuable auxiliary to blood-letting in abdominal inflammations is a principle which seems firmly established by the practice of various physicians in this country. It appears that its value (except as a palliative to uneasy feelings) is nearly confined to inflammations of the intestines, entirites and dysentery, and that it is important in them not only to diminish the quantity of blood which should be drawn to subdue the inflammation, but to relieve those very oppressive sensations which seem to be the connecting link between the inflammation in the intestines and the actions of the heart, and by which these actions are so often rapidly and irretrievably depressed. Under the full use of opium (after bleeding in these diseases) these feelings are often relieved, vomiting allayed, sleep procured, (whether with or without sweating does not appear to be material) and the pulse is found to rise in strength; and if, as very generally happens in well marked cases, the inflammatory symptoms recur, blood-letting may be repeated again and again without symptoms of sinking; the disease is placed as to its possible duration, and the effects of repeated blood-letting more on a footing with inflammation of other parts than it is when this auxiliary is omitted. Under this treatment, it may be stated with confidence that the success of treatment in these inflammations (when attended by the peculiar depression of the circulation, and when the inflammation is of the healthy character as distinguished from the erythematic and often epidemic perilonitis) is very considerably greater than when opium is withheld. *Alison's outlines, page* 247.

Blisters.

The subject of blisters may be dismissed here with remarking that the general principles of their use are applicable: perhaps they are not sufficiently employed in this country in rousing the subdued energies of the nervous and circulating systems.

Diet in inflammatory paroxysmal.

*Diet.* The diet in this kind of fever must not be so spare as in the ardent fever, but food should be given during the remission. It must still be bland farina, and, if the strength

Precautions in convalescence.

be very prostrate, a little wine added is better than to try to force strength by stronger food. After the return of fever need no longer be dreaded, there may be a *very* gradual improvement of food, this always remembered that a relapse of even a single paroxysm will weaken more than days of moderate starvation.

Modifications of treatment in congestive and typhoid paroxysmal.

Congestive.

Bleeding and purging require much caution as to time of use.

Quinine may be given earlier, and combined with opium in certain cases.

Advice to begin it as early as possible.

I proceed next to notice the modifications required in the application of our remedies for the treatment of the congestive and typhoid forms of remittent. I may do this in a general way, without remarking on each kind of remedy separately. In the congestive bleeding is indicated, but it is not so well borne; whichever way drawn, it ought to be before the paroxysm has even begun to subside. The same is true with regard to purging, and as we cannot always regulate its occurrence, we must be ready to moderate it, and to support the system against the collapse it may bring on, by small opiates, and by sago or arrowroot, after the stools, with a little wine added if necessary. I may here urge strongly the propriety of the recumbent posture under all circumstances in severe fevers. When we want to give mercury, but are afraid to purge, the twenty-grain dose is the best manner of administering it. I have met with this form of fever chiefly in natives, and when I get the skin perspiring I commence at once with quinine. If the head be clear, with much abdominal depression or precordial anxiety, I give opium in combination. Even Mr. Twining gave opium here, but it was with a very sparing hand. Specific rules as to what cases will allow and what cases will not allow of quinine are most difficult to lay down; but I may conclude by saying that in severe congestive remittent we can never consider the progress of the case satisfactory till it can be borne, and that it is much safer to give it too soon than too late. In this fever it can usually be given earlier than in the inflammatory remittent.

Typhoid.

Treatment requiring great

The typhoid form is the most difficult to treat, because depletion is ill-sustained, the secretions difficult to correct, and the remissions not well marked; besides this there is always a tendency in this form of fever to disease of the mucous lining of the intestines, for which reason probably quinine is not always well borne. We must steer our course cautiously, watching for openings as a pilot steering a ship through a coral reef; every remedy must be used as it were in a subdued form; leeching by driblets; purgatives in mild doses, salines especially, and these should be given almost as drinks; tepid ablutions, especially vinegar and water, several times a day; but when we get a fair remission quinine must be pushed to the limit it will be borne. In cases where the head is not much affected, the combination with opium is here most useful; food must be given in small quantities frequently, and wine may often be added. In cases of typhoid remittent, which are the result of a long sojourn in contaminated localities, there is a general cachexy where mercury seems contra-indicated, and in which the progress to death, though slow, is sure unless a change of air can be obtained. There is a good account of this kind of typhoid by Mr. Assistant Surgeon Kirk, as it prevailed at Goruckpore. He calls it congestive typhoid, and it is curious to contrast its progress, and the treatment recommended, with the account of the Mynpoorie and Bareilly typhoid given by Messrs. Macnab and Guthrie, wherein the former gentleman used mercurials and purgatives freely, and the latter, after holding some post mortem examinations, and discovering signs of high abdominal inflammation, bled freely with the lancet. Perhaps this typhoid form of remittent is that of all others where the observation (which however is true with regard to all epidemic fever) deserves most weight, that the fevers of different seasons and places require different methods of treatment. The remark is at any rate as old as the days of Sydenham.

caution and diligence—bleeding almost forbid—purging should be mild and saline—quinine not well borne, but must be used if possible, and combined with opium, if head symptoms admit.

Instances of this fever at Goruckpore.

Mynpoorie and Bareilly.

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* Vide volume 9, Calcutta Transactions. Mr. Kirk's paper is interesting and ingenious, though full of improved theories.

### CONTINUED FEVER.

Reasons for treating of ardent fever elsewhere.

A slight sketch of continued fevers.

I have treated of the ardent fever under a separate head. I thought it well to associate it more with remittent, because, according to my observation, there is a decided tendency in it to assume the remittent character, under circumstances where its own peculiar causes and malaria are co-existent. Here I will notice briefly other continued fevers of our climate.

Catarrhal fever.

A catarrhal epidemic fever, depending upon inclement weather, strong winds and sudden alternations of temperature, seen at the sudden advent of the hot season; the complications are usually far from serious, simply bronchitic; but I have seen pneumonia and acute pleuritis attend this form of continued fever, sometimes ending in purulent effusion. In the rains I have often seen a low form of continued fever, very prevalent after heavy falls of rain and stormy weather. I could not consider these as connected with malaria, from their want of paroxysmal tendency, and their being otherwise so mild in character. Though other writers have mentioned pains of the back and limbs as common in remittent, it has appeared to me that these symptoms are diagnostic of the fever here mentioned, particularly pain in the belly of the large voluntary muscles. The symptoms usually yield to purging and diaphoresis, and subside without any natural sweating; it happens occasionally that the symptoms become severe, with abdominal or other visceral congestions. I need not say more on the indications of treatment; the general principles already set forth render it unnecessary. The congestive fever of the cold weather, described by Mr. Martin and Dr. Twining as prevailing in Calcutta among all classes, and the symptoms of which resemble so much the typhus of Europe, I have not myself seen to prevail generally, though I have of course met with cases where with typhoid symptoms the remissions have been so little marked that the case might be called continued. I must refer to the works of the gentlemen named, and the readers will find it interesting

Mild continued congestive of the rains.

Diagnostic symptoms.

Continued congestive fever of the cold weather, described by Twining and Martin, compared with the remittent described at Mynpoorie and Bareilly by Macnab and Guthrie.

to compare the descriptions with those of Messrs. Guthrie and Macnab of the fevers of 1838 at Mynpoorie and Bareilly. In tracing similitudes and differences, he will perhaps be inclined to think that the features which were not in common depend more upon the rendering of the writers than upon the freaks of nature.*

### CONCLUDING REMARKS TO SECTION ON FEVERS.

Modifications of treatment in Europeans and in natives of different religions and castes.

Before concluding this section it may be well to allude to the acknowledged difference which is necessary in the treatment of the fevers of natives as compared with Europeans: not only is this true as regards depletion, (which they do not bear so well) but there exist differences among themselves, with reference to the same point, depending upon their habits and diet. The Mussulman and the Rajpoot are as far above the coolie in vital power as the European is above them. The Mussulmans eat a good deal of animal food, and the higher castes of the Hindoos consume food of a far more nutritive and wholesome character than the poorer classes, whose food is so bad and innutritive that they must all be considered to have constitutions little fitted for depletion.† Hence it follows that all remedial measures must be more moderately applied; that they will not endure so low a system of diet; and that tonics and stimulants are more freely borne, and in fever borne earlier. I believe it is correct to add that the use of mercury requires more caution in the ill-fed and impoverished classes, in whose constitutions there is so often more or less of a cachectic tendency.

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* It is also highly worthy of notice that while the Calcutta authors do not even hint at contagion the other gentlemen make positive assertion of its existence. There was hard labor, bad accommodation, ill-ventilation, poor diet, and the aggregation of people, to account for the difference—a proof probably of the convertibility of a materies morbi, originally depending upon external agents for its production, into a contagious virus eliminated by the vital processes.

† The poorer Hindoos who eat animal food will consume it of any quality, and this we know must be hurtful.

## SECTION II.

### CHOLERA.

Painful reflections on commencing the subject.

I approach the consideration of this disease with a feeling almost of melancholy, bearing in mind its dreadful fatality, the suddenness and uncertainty of its attack, and the little power which medicine exercises over many cases; but there is comfort in thinking I may be able to prove that a good deal can be done in the way of preventing the disease, and even of curing it in its early stages.

The contemplation of the dreadful mortality cholera has occasioned, and of the extent of human affliction it has produced, and will it must be feared yet give rise to, is best met by reflecting that, though these inflictions upon the human race are doubtless the decrees of an All-wise and over-ruling power, all the progress of science and discovery shews us that to a certain extent man is allowed to overcome the physical obstacles which oppose his comfort and well-being, by the exercise of his own ingenuity and intelligence. It may be that the day shall come when he can more successfully combat this scourge* of his race, and even at the present time the resources of art and civilization exercise a considerable power over it. In describing the symptoms, in tracing the history, in endeavouring to discover the causes, and in considering the best treatment, of cholera I shall endeavour always to distinguish between established fact and what is mere conjecture, so that at any rate I hope to shew the extent of our knowledge on this interesting and obscure subject.†

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* Capricious, intractable, inscrutable scourge of humanity. It had overleaped all sanatory cordons and quarantines, quelled the most opposite temperaments, resisted the most various atmospheric influences, and it threw a deeper shade over the horror of its ravages by " the mystery in which it stalked enveloped."—*Louis Blanc's History.*

† The annual average of deaths by cholera among the European troops in Bengal is 1 15 per cent; total 51 deaths per annum for 20 years, from 1825 to 1844—1845, will shew a fearful increase.

### SYMPTOMS OF CHOLERA.

Symptoms of cholera.

Non-professional people in India are apt to give the name of cholera to every case of violent vomiting and purging, and I fear that in many cases professional men have not drawn the line by which cholera is and should be clearly distinguished from any other disease: not only are there very many cases of vomiting and purging which are not cholera, but there are occasionally cases of cholera where there is no vomiting or purging. The symptom which appears to me never to be absent in cholera, and without the presence of which I would fearlessly say the disease is not cholera, (whatever other symptoms may be present) is the congee-like discharge. We may have no vomiting, we may have no purging, but that secretion will be found in the intestines; we may have collapse, we may have the sunk eye and the shrivelled skin (we have them in ague); but in no other disease (arising from natural causes at least) is there this congee discharge, well called therefore the cholera stool. In some cases certainly (before the stools are of that specific character) there may be symptoms of collapse, but I maintain that in no case of cholera is the rice secretion ever absent, and so in no other natural disease is it ever present. I say natural disease, because in the poisoning from some metals the stools will be found closely to resemble those passed in cholera. There is nothing original in laying down this as the pathognomonic symptom of cholera—but, though others have so treated it, I believe it has been a good deal lost sight of in a practical point of view.

The congee-like discharge is the true sign of cholera.

How an attack commences.

An attack of cholera usually commences with violent vomiting and purging, the action of the stomach is sudden and violent, and the stools usually pass off with considerable force; the matter first ejected may be the natural contents of the viscera, but the specific character of the evacuation is soon apparent—a state of anxiety, restlessness and jactitation usually comes on early, accompanied by a feeling of great prostration. The effect upon the pulse varies greatly in the different cases, and affords the best index of the degree of danger: while it has volume and regularity of beat we may always hope—according to its feebleness and irregularity is the degree of our apprehension. The tongue should be often examined; as collapse proceeds it becomes cold; returning warmth will be a sign of re-action. The skin in this disease also affords useful indications of the state of the patient: its dry warmth is a good sign. In bad cases it pours out cold clammy sweats, becomes shrivelled, and has the singular property of resisting the power of heat to raise its temperature. The sunken dark ring round the eye* in cholera is a sign that is seldom mistaken by any one who has seen the disease a few times, nor is it easy to forget the loss of voice peculiar to this disease. As it proceeds to a fatal termination, the accumulation of terrible symptoms in a case of cholera may be thus described: there is no pulse at the wrist, and the action of the heart itself is very feeble; the skin is cold, shrivelled and clammy, sometimes of a blue color, especially on the hands and under the nails of the fingers and toes; the face looks dreadfully sunk, and there is the particular dark ring round the eye already mentioned; the tongue is cold, and the voice is reduced to a whisper; there is often excessive thirst, with a burning sensation at the pit of the stomach, and a dreadful sense of oppression in the chest and at the præcordia; spasms of the legs and arms are common, but by no means constant symptoms.† The patient often lives for many hours in this hopeless state, in many cases remaining sensible to the last, in others falling into a state of coma.‡ The improvement of the pulse, the return of warmth to the surface, usually but not always the ces-

State of the pulse, tongue and skin.

Progress of symptoms in a fatal case.

Symptoms which mark the progress to recovery.

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* The eye itself appearing retracted in the orbit.

† It is a notable fact how much less common spasms are now than they used to be.

‡ The fate of the patient is usually decided within six hours.

Internal functional derangements.

Analysis of the discharges.

sation of vomiting and purging, are the symptoms which mark a favorable change.* It is often a long time before natural secretions are restored, and in some visitations coma is apt to come on very insidiously, and to terminate fatally when the other symptoms have long subsided. The re-active stage so common in the European cholera will sometimes be met with here, especially in Europeans.† It is very important to observe that many cases of cholera are preceded by diarrhœa. This circumstance will be dwelt upon at greater length, when we have to consider the treatment. I have described what may be called the physical signs of cholera—other internal functional derangements remain to be noticed. The secretions of bile and of urine are totally suppressed, and the blood, deprived of much of its water, is thickened and of a dark pitchy color. It has been proved by experiment that the lungs absorb less oxygen and give out less carbonic acid, according to the progress of the disease; the air expired is of the same temperature as when it passed into the lungs.‡ Drs. Twining, Christie, Herman, and others, have given us analyses of the aloine discharges, which must be termed unsatisfactory, as they differ from each other, and neither experimenter has thrown any satisfactory light on the treatment. According to Twining, "the peculiar secretion of cholera is proved to consist chiefly of mucus and a peculiar morbid secretion, without any appreciable quantity of the serum of the blood," vide page 382, 1st edition.§ The discharges from patients suffering under this disease were subjected to experiment by Dr. Christie: the secretion consisted of two substances—the one a transparent serous fluid, the other an opaque white coagulum; the former perfectly soluble in cold water, the latter quite insoluble. These matters being submitted to the action of re-agents, the fluid part was found to be pure serum, and the coagulated part fibrine. *Vide article Cholera, Cyclopedia of Practical Medicine, page* 386.

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* Few fatal cases are prolonged beyond thirty-six hours, except when death is the effect of re-action or coma.

† Twining observes as a general rule that few survive who have had no pulse for three hours.

‡ According to Dr. Witstock, of Berlin, $\frac{1}{4}$ of the natural quantity, or $\frac{3}{5}$ per cent.

§ In some cases the discharges are tinged with blood. I have often seen this in prolonged cases, especially where hiccup is present. In fact we have then gastro enterite.

In the next page of the same work we have another analysis: the fluids voided by stool and vomiting contained, (according to Dr. Herman, of St. Petersburgh,) besides water, some acetic acid, a small quantity of ozmazome, salivary matter, butyric acid, and mucus; they very much resemble the gastric juice, but do not contain any free muriatic acid. Dr. W. B. O'Shaughnessy, a highly distinguished chemist, and a member of the Bengal Medical Service, gives the following result—*see page* 490, *Lancet, volume* 1*st*, 1831-32.

Result of Dr. O'Shaughnessy's investigations.

1st. The blood drawn in the worst cases of the cholera is unchanged in its anatomical or globular structure.

2nd. It has lost a large portion of its water, 1000 parts of cholera serum having but the average of 800 parts of water.

3rd. It has lost also a great proportion of its neutral saline ingredients.

4th. Of the free alkali contained in healthy serum not a particle is present in some cholera cases, and barely a trace in others.

5th. Urea exists in the cases where suppression of urine has been a marked symptom.

6th. All the salts deficient in the blood, especially the carbonate of soda, are present in large quantities in the peculiar white dejected matters.

The discrepancies between chemists on many questions of organic chemistry shew that we have much to learn yet in that branch of science; even the beautiful theories of Leibig on animal combustion have been plausibly refuted.* From

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* "With regard to the composition of bile the greatest variety of view presents among the most distinguished chemists."—*Wagner.*

Dr. O'Shaughnessy's enquiries I think we gain very important points of information: we see one manner in which death arises; we get some clue to the principles of treatment;* and are able to account for the operation of the remedies found most useful. In part 2nd, page 263, of Wagner's Physiology, translated by Willis, I find the following: "Drained of its water in cholera, it (the blood) contains a much smaller proportion of this fluid, and a much larger one of albumen, fibrine, and corpuscles, than in health." This work was published in 1842, since which time I am not aware of any thing new upon this subject.†

POST-MORTEM APPEARANCES.

Morbid appearances peculiar to the disease.

It seems to me that most of the lesions discovered after death are rather to be considered as effects of the disease than as essential to its existence. Most of them are absent in suddenly fatal cases, and as life is prolonged, or re-action greater, we have more appearances of congestion or inflammatory action. The surface of the body is shrivelled and deprived of its blood, while the great vascular trunks in the internal cavities are gorged with that fluid in a thickened state. In the mucous lining of the stomach and bowels there are a pastiness of feel, an easier separation from the cellular coat below it, with an appearance of tumefaction. There is usually a quantity of the cholera discharge found in the stomach and bowels, and many observers (in India and on the continent particularly) have described a peculiar viscid secretion adhering to the mucous membrane. This secretion, varying in shades of coloring, has been particularly noticed by Sir James Annesley and others. Sir James notices its greater viscidity in cases where death occurs early, and that it becomes separated in the progress of a case.

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* As I shall endeavour to shew when on the subject of the treatment.

† "Cholera blood loses nineteen parts in one hundred, or 5lbs. of water on the whole mass estimated at 30lbs."—*Dr. Witstock, of Berlin.*

It is a very curious circumstance that, though no bile flows into the intestines in cholera, the gall bladder is always found to contain bile, and is often full of it. Some authors describe the ducts as affected with spasms, or being mechanically obstructed; but others describe the ducts as open and permeable. This state of the gall bladder is noticed in the reports of the Boards of the three presidencies when this disease first attracted attention. It was also noticed as a morbid appearance occasionally in Britain and on the continent, but (as far as I can ascertain, after careful perusal of much that has been written on the subject) not much stress has been laid upon this curious fact that, though the liver secretes no bile after the disease is established, the gall bladder is full of that fluid, though the ducts are often pervious. "The gall bladder is full of bile and the ducts pervious."—*Report of Monsieur Chamberet, a member of a medical commission sent from Paris to Warsaw.* What then can be the cause why the gall bladder has not emptied itself, and through its own duct, and the common one poured out its contents into the duodenum? I believe the reason to be that the suspension of function in the liver suspends also the contraction of the ducts by which they propel the bile forwards: this is I believe now called the peristaltic movement of a gland duct. It seems obvious that the mere emptying of the gall bladder itself could exercise no influence over the disease, as Dr. Macgregor has supposed.* The liver is usually seen to be gorged with blood, and this blood of course is darker than natural, as is all the blood in the body;† the bladder is found shrunk and empty; and the kidneys, though they have ceased to secrete urine long before death, have a healthy appearance. This fact should be noted as very remarkable. The renal arteries come off direct from the aorta, and have to run but a short course. In health the secretion from the kidneys and skin is never suspended. In the thorax the lungs, large venous trunks, and right cavities of the heart, are found engorged with dark, thickened blood. Some observers have stated the peculiar white viscid secretion described as lining part of the small intestines, to have been seen on the mucous lining of the bronchial tubes and inner surface of the bladder. The brain usually shews signs of congestion; and where coma has existed there will often be effusion in the ventricles or between the arachnoid and the pia mater.

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* Not an original theory—see Good's Study of Medicine, page 281, volume 1st, 2nd edition.

† The left cavities of the heart, and even the arteries, have been said to contain dark blood, and in both even polypi have been found.

The appearances of inflammatory action and intense congestion are found in the small and large intestines, varying in their intensity according to the period the patient lives, and the amount of re-action. I believe I have described already what are truly the pathological effects of cholera: the thick and darkened blood, its collection in the lungs and large internal venous trunks, the peculiar viscid substance adhering to the mucous lining of the small intestines, the peculiar swelling and softening of that membrane, and the collection in the duodenum and small intestines of the cholera fluid; I must include the distention of the gall bladder with bile. All other appearances given in such detail by many observers I believe not to be constant, and to be but effects of the disease.

### HISTORY OF CHOLERA.

History.

It seems clear that cholera was a disease known long before 1817.

Arguments in proof that cholera is not of recent origin.

May we not even suppose that this is the disease which Sydenham describes in the following words: " vehement vomitings, and difficult and painful dejections of ill-conditioned fluids, agony and inflammation of the intestines and abdomen, cardialgia, thirst, a quick pulse often small and unequal, heat and anxiety, nausea, and colliquative sweat, spasms of the arms and legs, fainting, coldness of the extremities, and other symptoms of equal danger, which terrify the by-standers, and kill the

Described by Sydenham and by Celsus.

patient in twenty-four hours." If I am told that the above description applies to bilious cholera, all I can say is that I have seen many cases of bilious cholera, but never one with such severe symptoms, and no fatal one. If the discharges were bile, why are they called ill-conditioned fluids? The description given by Celsus, too, seems to me to prove clearly that even as far back as his time true cholera-morbus was not an unknown disease. "Bilis supra infraque erumpit primum aquae similis deinde ut in ea recens cara lota esse videatur interdum *alba* nonnunquam nigra vel varia, 'quibus concurrentibus non mirum est si subito quis moriatur.'" Aretæus too gives an excellent description of the disease.

Leaving here out of the question that the disease is described by Celsus as suddenly fatal, (a description which does not apply to the bilious cholera) I must be permitted to ask how "like water," "like as if fresh flesh had been washed in it," "sometimes white," can apply to bilious evacuation? The truth seems to be that when Celsus wrote, and even later, all intestinal discharges were called bile, whatever their color might be.

And known in India before 1817.

But even if not a disease of so remote a date, as I consider it, (and after all the question is more curious than useful)* it is quite clear that it was fully, faithfully and specifically described by several authors long before 1817, and had raged as an epidemic on several occasions, as has been shewn by Dr. Mason Good, my friend Mr. Martin, and many other writers.† It is not my intention to go at length into the history of cholera since 1817, from which time to this its out-breaks have excited abundant attention. It has remained a constant resident in Hindoostan, paid a visit to the continent of Europe, to Great

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* It may appear to some that I have here entered upon the proof of what requires no proof; but they will change that opinion when they learn that many modern writers, and among them Dr. Copland, assume it as a fact that cholera first appeared in 1817, and so does Dr. Forbes in a late number of his review.

† See also Jameson's report. There is a return in Dr. Copland's Dictionary, shewing that in England and Wales 54,552 persons were attacked with cholera, out of which 21,571 died.

Brief sketch of its progress since 1817.

Britain, and even across the Atlantic to America; authors have traced its progress from Jessore, in 1817, in various directions, and they have especially given us its route to Russia, through Persia, Arabia, Bombay, &c., it occupying a period of fourteen years in its travels. The two main facts and many of the intermediate ones are indisputable, that the disease was more violent than usual at and around Jessore in 1817, and that it only appeared in Europe in 1831. It is also true that from Bengal its progress towards Europe has been gradual, but how that progress has been so accurately traced, and it can be proved to have followed on the land journeys and sea voyages of human beings, I cannot so easily determine—no doubt the great lines of human communication are those where the progress of any important piece of intelligence can be carried and heard of.*

Question of contagion.

I am at any rate sure that if cholera has travelled by means of men's inter-communication, I shall be able to shew that, as we meet it at present, it cannot be called a contagious disease; and that is the practical question we have to decide from its history followed down to the present time. While the question of the contagious nature of the plague remains yet unsettled, we need not feel surprised that cholera should be in a like predicament. It is curious to observe how the advocates on each side of a disputed question collect what they call facts: and it is also worthy of remark here that no febrile diseases have usually been considered contagious in India except the exanthemata. Mr. Wakeley, the talented editor of the *Lancet*, whose position gave him a full acquaintance with all the facts on both sides, declared his belief in the most emphatic manner that cholera spread by contagion. He stated that a man must be without brains who could

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* "The course of the epidemic was obvious: it broke out in Malta within 48 hours of its appearance in Palermo; it attacked Gazo at the same time." The military and those who observed quarantine were attacked in a proportionate ratio with the rest of the population, and at the time of its cessation the whole population were convinced that it was non-contagious."—*Forbes' Quarterly.*

Practical observations on the appearance and cessation of the disease.

doubt the evidence, yet in 1833 we find him a convert to the late Dr. Robert Tytler's theory that the use of diseased rice was the cause of cholera. This at any rate proves to us how difficult the question is. But I return to the slight sketch of the history of cholera, by remarking that since 1834 it has totally disappeared in Europe, but continues in India, and has greatly increased in malignity. During the present season its ravages at Kurrachee (destroying 273 men in the 86th Regiment alone in a few days) have been fearful, while in the Bengal Presidency (in the upper provinces in particular) it has scarcely appeared.* Confining one's observation of cholera to localities with which he is himself acquainted, we begin to look for it after the setting in of the hot weather, some cases almost always occurring at this time, but the prevalence and malignity of the disease differing greatly in different seasons (during the last five or six years I served in Tirhoot its ravages were fearful); after the rains have fairly set in we expect it to subside, and we are usually not disappointed; but an interval in the rains of hot dry sultry weather will make us fear its return; and when the monsoon breaks up early we may be fearful of seeing it again.† Though the disease has travelled to and prevailed in cold countries, and though its worst visitations even in India have sometimes been in the cold weather, the local observer (the result of whose experience I am now giving) will never expect to see a case of cholera from the time the cold weather has fairly set in until the next hot season.‡

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* Written in 1846.

† Certainly the monsoon would appear to have some connexion with cholera—its time of appearance may usually be traced each year from Bengal towards the north west.

‡ Total deaths in London in three epidemics :

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| 1832, | 3,200 |
| 1833, | 1,110 |
| 1834, | 630 |
| Total, | 4,940 |

On the 6th of Novr. 1817 cholera appeared in the grand army of the Marquis of Hastings—in five days 5,000 men perished—in all 9,000. At Banda in March 1818 10,000 deaths.

This then I suppose we may call the endemic character of cholera, to prevail at times when there is an extreme degree of heat with sudden falls in the temperature. Those who trace its epidemic spread to contagion, will not seek or look for climatic vicissitudes, and if they did I must admit that there would often be great difficulty in discovering any thing satisfactory. My own opinion is that the epidemic and endemic only differ in the wider spread and greater intensity of the remote cause. The plague is endemic in Egypt, sometimes rages there as an epidemic, and occasionally appears in other countries. The suddenness with which cholera invades and the equal rapidity of its disappearance have often been noticed, and of late years it has attracted observation how often troops are attacked on a line of march, and in particular parts of the route. This, too, at a time when the inhabitants of the country are healthy.*

When it breaks out in a cantonment, it is very common to see it confined to one regiment, and even to particular companies of a corps: so in a native village have I known one circumscribed spot to be the scene of its ravages.

Before cholera reached Europe its advent was foretold as early as 1822.

Who shall venture to predict if its future history is to be that it shall continue the scourge of this country, become a greater one even than it now is, or gradually disappear?

### REMOTE CAUSE.

Remote cause not yet discovered.

The question of the remote cause has engaged the attention of the profession for 29 years, and during that period many acute intellects have been employed in the investigation; yet it has not been discovered. We can only state what we think is most probable; but so it is with other diseases, both contagious and not contagious. We believe, as we cannot doubt, that the causes of small pox, measles and scarlatina, float in the atmosphere; and, though they are generally exhalations from a human subject affected with them, they seem even now at times to have a spontaneous origin. How they at first arose, and why they only spread in particular years and at particular seasons, are questions yet unanswered.* No chemists that I am aware of have ever been able to detect these impurities or any other contagions in the atmosphere. Marsh miasm has equal obscurity attached to it. We conclude by general reasoning, founded upon observation, that the decay of vegetables infuses injurious principles into the atmosphere; but the chemical analysis of the atmosphere does not enable us to detect it, nor has it perhaps been proved that there is an actual substance which enters the body and gives rise in one case to a regular intermittent, in another to remittent fever, in one season causing endemics in others widespread epidemics.† The difficulty with regard to cholera does not seem greater than those above stated: we are not certain of the actual introduction of a material substance; it may be that the proclivity and exposure to the cause so derange the vital functions as to give rise to the train of symptoms.

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* Dr. Lorimer has given a great variety of valuable statistical facts—among others he shews that marching does increase the chance of attack, and that it enhances according to the length of a march, and to the numerical strength of the troops.

But neither can we detect the cause of small pox or scarlatina in the atmosphere.

And with respect to malaria the same is true.

It is not heat or cold alone that causes cholera, for we see the extremes of both without the disease. With sudden alterations of temperature and unusual states of the weather it does seem to prevail; but can it be denied that we often have these without cholera being the consequence? A specific exhalation from the human body will not I think explain the origin of the disease, nor many points of its every day history. After large experience in this matter, I must express my own total disbelief

Heat or cold in any extremes cannot cause it.

Nor can it in the author's opinion be an exhalation from the human body.

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* "The fact is that the cause of the periodically increased intensity of plague, like that of the fevers of the West Indies, of the Guinea Coast, and of Ceylon, the variola of some parts of Africa, the yaws of Guinea, and the cholera of Hindoostan, is perfectly inappreciable by us."—*Forbes' Quarterly*.

† Air that contained no more than $\frac{1}{1500}$ of its bulk of sulphurated hydrogen was sufficient to prove fatal to a bird, $\frac{1}{800}$ destroyed a dog, $\frac{1}{250}$ killed a horse.

of the contagious nature of cholera, and I believe this to be the present opinion of the immense majority of the medical service in India. I am aware of the difficulty of this question of contagion as a general one, and also of the ingenious arguments for both sides of the question which have been adduced, as regards cholera—but it is not my intention to enter into the argument at length. The opinion I give I wish to be considered as the result of my own observation chiefly. I cannot consider the disease contagious, because I have seen it occur sporadically without any apparent reason, and when I have known many cases occur daily among prisoners, until measures were adopted which did not involve a cessation of intercourse, yet on the adoption of those measures it ceased at once. It has often been known to attack numbers for days, and then to cease quite suddenly.* It has attacked troops leaving a healthy station, and passing through countries where the disease was not present among the inhabitants; and lastly it has been remarked by Annesley, Twining, Mouatt, Corbyn, Jameson, and a host of others, that the attendants on the sick (and this is entirely accordant with my own experience during twenty-one years) have not been observed to suffer from the disease more than others similarly exposed to the other influences.† That practical and talented man, the late Dr. John MacIntosh, of Edinburgh, stated that he, his assistants, and the servants of the Cholera Hospital, had exposed themselves in every possible way to the sources of contagion without having suffered. Not many years ago I recollect hearing of a regiment, proceeding by water down the country, having the disease very badly, till it met a corps coming up-country, with which it exchanged boats; the disease stuck to the boats, left the corps it had first afflicted, and attacked the new regiment, which before had a clean bill.

Practical reasons for this opinion.

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* The author of the article Cholera in the Cyclopedia of Practical Medicine believes that the disease spreads by contagion, requiring however a local nidus of susceptibility.

† For the latest enquiries on this subject see *Forbes' Quarterly* for April 1847, and Dr. Copland's Dictionary of Practical Medicine, article Pestilential Cholera.

Remarks on the local nature of the cause.

This leads me again to remark on the seemingly local and confined action of the cause of cholera, and this even during severe invasions. I will illustrate what I mean by examples: I once had a chokeydar (watchman) attacked while sleeping in the western verandah of my house at Mozufferpore, in Tirhoot. I shut up the verandah, forbidding my children to frequent it, or any one to sleep there; about a fortnight after the chokeydar's siezure a servant boy, who had been employed in attending the prisoners in the jail sick of cholera, returned well after the disease had sometime ceased in the jail; he slept in the verandah and was that night attacked. At an indigo factory I once saw a number of carpenters attacked, during a period of some days, while at work in an open shed; in the opposite side of the same shed were a number of blacksmiths at work, not one of whom had the disease. Dr. French, of the 49th Foot, in one of his reports, mentions the circumstance of the two flank companies entirely escaping, and they alone, during an outbreak at Hazareebaug: *there* was a separate building for each company. The appearance of the disease in ships at sea, after being healthy for days after leaving land is also remarkable. I have dwelt on this point of the locality of the cause at some length, because it is of great consequence as a measure of prevention, (better than cure here) for two very obvious reasons: I have seen its good effects; and I accordingly exhort my reader to let no theory of contagion or any thing else deter him from putting into practice a change of locality, where it is possible. It may be well to allude here to some peculiarities which have been mentioned with regard to the remote cause. Mr. Jameson states that one attack almost always secures a person against a second, and he further mentions what would be very curious, if true, that the mere exposure to the influence of the cause exempts not only individuals but bodies of men and localities from future visitations. Facts are given in corroboration; and nothing could shew more clearly how difficult these questions are, or how guarded we should be in drawing conclusions from a limit-

Useful practical deduction from this.

Other peculiarities of the remote cause.

ed sphere of observation, than the circumstance that at the present time I do not consider it necessary to enter upon a formal refutation of these ingenious theories. Mr. Orton, the author of a very learned and clever work on cholera, frequently states that the disease follows quickly on exposure to the cause. Now there is nothing which seems to be more certain (as far as we can be certain on such questions) than that in some cases days intervene between the two circumstances, and I believe that we have here an explanation of many facts in the history of outbreaks which we cannot account for otherwise.

Author's opinion of what probably is the remote cause.

It is time to say something positive of my own opinion of the remote cause, but in truth I can more easily say what I do not believe than what I do. This much however seems certain that unusual states of the weather bring on the disease with greater intensity, be it a poison sui generis, or be it dependent, as Mr. Orton so ingeniously argues, on the electrical state of the atmosphere. According to his reasoning, the diminished density of the atmosphere diminishes the quantity of free electricity, and it is this deficiency which he considers to be the cause of the epidemic.* The supposition that cholera is in some degree connected with electrical changes will appear extremely probable when we reflect upon the resemblance which exists between the action of the nervous power and electricity, and how much the secretions which depend upon the nervous influence are deranged in cholera. Dr. Prout, for more than six weeks before the appearance of cholera in London, had been in the almost daily practice of determining the weight of a given quantity of air under precisely the same circumstances of temperature and pressure. On the 9th of February 1832 the weight of the air suddenly rose above the usual standard, and it continued so for six weeks; on the 5th of February the wind which had been west veered round to the east, and the first cases of cholera made their appearance.*—*See Brande's Dictionary of Science, article Air.*

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* "From some periodical and exaggerated condition of developement, particular species (too minute for the most powerful microscope to descry) may suddenly swarm in the air or in the waters, and penetrating the internal vessels and organs exert an injurious influence of a specific character on the lining membranes and fluids of the human frame, and from this inscrutable agency may possibly originate the cholera influenza and other epidemics." —*Dr. Holland.*

PROXIMATE CAUSE.

Reasons why the author believes that the disease begins in the abdominal visceræ.

And is dependent on loss of nervous power.

Loss of secreting power in the liver and kidneys.

What is the first link in the terrible chain of diseased action? I believe we must look to the abdominal visceræ for an answer: the important eliminating functions of the liver and kidneys are no longer performed, and, whether we agree with the physiologists who think that these glands merely act as filters to strain off substances already existing in the blood,† or with others that all the chemistry required to extract or form these substances takes place in the glands themselves, it seems that we must admit that they have lost their function from a want of nervous power. It cannot be for the want of a proper supply of blood that no bile or urine is secreted, for there are cases of pure and well marked cholera where the heart continues to act strongly, after the secretions have ceased; and though we might imagine that the peculiar portal circulation might even then be stagnant, the same would not apply to the kidney supplied with the blood, from which it secretes by a direct and near communication from the aorta. Another early, perhaps indeed the earliest, symptom of all is the profuse discharge from the mucous lining of the stomach and bowels. If we knew more of the relative functions of the minute anatomical structures of the intestines, we might perhaps understand how it happens that the water of the

Peculiar exudation from the stomach and bowels how probably produced.

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* "Mr. Julia de Fontenelle, a member of the central commission of health, collected and analyzed the air of different parts of the capital, and proved its purity."—*Louis Blanc's History.*

† Not making pretensions to much knowledge in physiology, I yet feel surprise that it should be a question whether bile, urine, &c. eliminated so largely exist in the blood, a common analysis of blood would seem enough to dispose of the question. I no where see that bile or urine are constituent parts of it.

blood in large quantity, and holding its saline ingredients in solution, gets an outlet through some part of the organism. As it is not a produce of glandular vital action, but a constituent part of the blood, we may believe what is positively asserted, without perhaps taking the circumstance just mentioned into consideration, that it exudes from the blood vessels. Does it come from the arteries, or from the veins, or where the extreme ramifications of the two meet and are called capillaries? In the liver and kidney I assigned the non-secretion to want of nervous power. May I be right here again in saying that the exudation from the vessels has an identical explanation—some writers have argued that the congested state of the portal system may lead by the fulness of the vessels* to a forced exudation; but if that was the explanation I do not think we should have co-existent and antecedent sometimes to the aqueous discharges, other symptoms of great nervous prostration, cold clammy sweats such as occur after bleeding or in other cases of collapse and clearly dependent not on congestive fulness but on the want of the proper nervous tonicity; nor is it unimportant to bring to mind that many cases of ordinary collapse are accompanied by watery purging. I believe then that a profound impression made on the functions of the nerves supplying the abdominal visceræ, stopping, secretion, and admitting of exudation, is probably the first and heaviest link in the chain of diseased action.† Let us proceed to a consideration of the other morbid conditions. The contractile propelling power of the heart is usually affected early and seriously in the disease. Is that the first link, or do those last men-

Effect of the disease upon the heart considered.

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* If we consider the weaker action of the arterial circulation, and that the absence of secretion by no means proves a stoppage of circulation, there is still less argument I submit to support the above view. If turgescence alone caused exudation, the vessels would soon be relieved, "and the escape of fluids from the vessels in particular must be impeded, and may probably be variously modified by the exercise of their tonic power."—*Alison.*

Professor Alison, see page 109 of his Physiology, argues that secretion does not depend on nervous power, but on what he tioned precede it? Whether the loss of power arises by a direct impression on the nerves of the heart or otherwise, its diminished action would not account as I believe for the immense discharges of the watery portion of the blood, nor for the stoppage of biliary and urinary secretion. The nerves that supply the heart with contracting power* are a part of the same great system, the great sympathetic, and the heart may have its power enfeebled by a direct impression, but it is very well known how death often arises by asthenia, from its sympathy with the abdominal viscera. I yet maintain that the first link in the chain is the functional disturbance in the abdomen. I wish I could feel sure that it was firmly secured to the anchor of truth. It would be presumption to say or to think that I had hit the nail on the head which so many have struck at in vain, and I know that even if I am right it would yet remain to be explained how and why the nervous energy of these organs is weakened.

The state of the blood, of the circulation in the lungs, and of the animal heat.

Another series of phenomena are considered by some entitled to the chief consideration in our present enquiry—the thickened state of the blood, the consequent difficulty of its circulation through the lungs, its non-absorption of oxygen, less carbonic acid too being evolved. Grave as these symptoms are, and undoubtedly those which in many cases lead to death, I consider that they are all explained as effects of what occurs in the abdomen, by which the blood has been drained of its aqueous proportions. It cannot reach the extreme vascular ramifications in the lungs, it returns unoxygenated to the left side of the heart, affording it no due stimulus to contraction, and, if it did, only carrying poison to the organs. We shall observe that if this serious train of diseased action

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calls vital affinity in the organ itself. I am at a loss to understand how there can be any vital action without the nerves being engaged. If we refer the function to the blood vessels, we know that they are dependent on nervous power, not only so in the great central organ, the heart, but the twigs of the sympathetic follow the most minute vascular ramifications.

* See Dr. Carpenter's Human Physiology, page 394.

Author's reason for considering that all these symptoms depend directly or indirectly on nervous shock.

arose from a direct impression made on the functions of the heart or lungs, it seems to us that death would be more immediate. As it is, these effects are always gradual, generally partial, and often recovered from. The present view of the subject is also supported in the strongest manner by the truly wonderful effect of Dr. W. B. O. Shaughnessy's suggestion of injecting weak saline solutions into the veins, the nearest approach to an immortal discovery that this disease perhaps the last thirty years have originated.

The cold sweats appear to be further evidence of this.

It must perhaps be admitted that there are some cases where death arises suddenly, without much watery discharge having occurred. In such instances the gradual occurrences in the lungs and heart just noticed would not be likely to arise; death ensues at once by asthenia, or the want of propelling power in the heart; so it does after a severe blow on the pit of the stomach. Do not both act through a nervous shock on the semilunar ganglion? The profuse discharges from the skin appear to me but further evidences of a loss of tone in the vessels, such as we see, though in a less degree, as the effect of excessive fear, and in the collapse of fever and other diseases.* The amount of cold clammy sweat exuding from the blanched, almost bloodless, surface seems to disprove the argument that congestion is to be considered as the cause of the alvine discharges. That there must be inward congestion at the stage of the disease where the skin is cold and clammy is undoubted, but we often have the specific discharges, and the absence of secretion long before this period. The spasms are a proof of nervous disturbance, and probably depend on reflex action excited by the novel irritation on the mucous lining.

Cause of the coldness more fully considered.

The low temperature is to be explained, according as we believe that heat is generated in the lungs or in the renovation of the tissues, by the oxygen received in the lungs acting upon their carbon. In either case it would seem that the non-production of it must depend mainly on the want of oxygen; it is proved to be inhaled in less quantity, and after some of it does get into the blood it is imperfectly conveyed into the tissues from the impaired action of the heart, and the probably impaired action of the capillaries, as they act independent of the heart's movements; yet I think it an interesting point to consider how far the coldness depends on want of nervous power in the parts of the system, where the metamorphosis of the tissues and the probable generation of heat occur; certain it is that in other diseases where death arises by apnæa or want of air the coldness is not so marked or peculiar a symptom. Such is an attempt to explain the sequence and nature of the symptoms of cholera, all it will be seen attacking the organs and functions of organic life. The animal functions preserve their integrity till they are deprived of oxygenated blood, on the supply of which all life depends. Sensation, thought, and volition (or the act of the will leading to motion), all remain perfect except in the last stages of cases where dark blood reaches the brain by the arteries.

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* In another set of cases there will have been trifling discharges, but death will occur gradually. Here again we shall see the chest symptoms, and the condition of the blood altered.

These views not professed to be original, being nearly those of Twining, Annesley, and G. Hamilton Bell.

The views set forth above make no pretence to originality: they are grounded upon suggestions first offered I think by Mr. George Hamilton Bell, Twining, and Annesley, had come near to the same theory of the disease; but I have attempted more to localize the first diseased movement, believing that the exudation from the mucous lining may and does occur often before the circulation is affected, and therefore not agreeing in the correctness of the following proposition of Mr. Bell's: "the symptoms of cholera asphyxia throughout its course must be referred to the condition of the circulation. At whatever period of the disease the state of this important function is examined, it is found to be morbidly affected."

Question considered how and why the nervous power becomes weakened.

I may next briefly enquire how and why the nervous power is weakened, whether it be so only originally in the abdominal viscera, or, taking a wider view, in all the functions of

Effects of malaria and other poisons somewhat resemble the symptoms of cholera.

organic life. Let us take the instance of an ague fit—it is admitted to depend upon an ingested poison, the heart labors, the surface gets cold, the secretions are checked more or less completely; all these are effects on the functions of organic life, having much similarity, though not amounting in degree, to what takes place in cholera. If a person takes a dose of prussic acid death is almost immediate, and the first impression must be on the nerves of the stomach,* though death takes place at the heart. The effect of a large dose of arsenic, when death takes place before the inflammatory appearances can arise, shews symptoms wonderfully resembling those of cholera: vomiting, purging, cramps, cold skin, clammy sweats, enfeebled pulse, suppression of bile and urine, blueness and death may all be present. And I may also mention that the injection of tartar emetic in considerable quantity into the vens will produce a train of symptoms something like cholera.—*(See Christison on Poison.)* The above will shew that the supposition of an inhaled substance producing cholera by its depressing action on the nervous system is not opposed to general principles. The difficulty in this instance seems to be that we cannot give a local habitation and a name to the substance. If indeed we had distinct proof of a generated human virus capable of re-producing the disease in even a few of those who inhaled it, much of the difficulty would be over, at least it would then be in common with what meets us respecting other contagions. But there are two circumstances in the every day history of cholera that seem to me to disprove its spread by contagion—I mean the rapidity with which it often siezes upon

Question of a generated human virus again discussed.

Author's reason for believing the disease does not spread by contagion.

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* See *Lancet*, volume 1st, 1831-1832, page 287. Dr. Copland, I find since writing the above, adopts almost a similar view of the proximate cause, with the difference however that he traces the first diseased movements to the organs of circulation.

Lately physiologists have endeavoured to prove that all poisons act by absorption; certain it is that some poisons are absorbed in a very brief period. This need not be wondered at when we reflect that the whole blood in the body passes through the heart from 15 to 20 times in the hour.

a number of victims at the same period of time, and the equal suddenness of its departure, while its source of contagion must still be in a high degree of developement. In this respect cholera differs from all other contagious diseases. "We have known in a cantonment perfectly free from the disease ten men of the same regiment to be attacked in a single night, and each case to be fatal, while no fresh case occurred afterwards in this corps or any other."* I am fully aware that, with respect to many contagions having an epidemic character, it is true that at times the materies morbi affects but a very few, while at other times it takes on a wide-spreading character, but the subsidence and the lighting up are gradual operations.

Nor by other known laws and sources of disease.

The difficulty of accounting for the spread of cholera by all the known laws and sources of disease has led some to attribute it to electrical causes. As we are ignorant of the action of electricity upon the vital movement, the supposition is in the present state of our knowledge purely conjectural. The similarity existing between this wonderful agent and nervous action has long been recognized, and I may allude to the experiment of the division of the eighth pair stopping digestion, the connecting of its directed ends by an electric current restoring the function, and to the fact of certain secretions becoming restored by means of electricity or galvanism.†

The belief expressed that it may yet be found to depend upon electricity

This opinion confessed to be purely hypothetical, but reasons given for entertaining it.

It is true that to consider the remote cause of cholera as depending in some way upon electricity is purely conjectural, like the theory which ascribes it to invisible animalcules floating in the atmosphere; but it appears to me I confess extremely probable that future discovery will shew that this powerful but occult agent is the cause. If we consider the human body a great laboratory in which many chemical operations are constantly going on, and consider also the almost proved identity of electricity with chemical affinity, and the varying electric conditions of the agents which surround us, the present view of the subject will not perhaps seem improbable ; at any rate it seems clear it is not a contagious virus or a virus convertible like some into a contagious one. It is not like any terrestrial exhalation we are acquainted with, if it is one at all, for the disease has spread inobedient to the laws of gases, or other substances diffused in the atmosphere, and has arisen where it is almost certain exhalations could not exist ; it has however been frequently observed that when the disease is present, it greatly affects damp and filthy localities ; it is in these that we might expect disturbed electrical conditions in the system and its surrounding media.* It is not mere atmospheric vicissitude, for it is seen in dry cold weather, in cold and damp weather, in dry hot weather, and in hot and damp weather, and it is often absent in all of them, although, as Dr. Lorimer has shewn in his report from Madras, damp is a favoring circumstance, especially when associated with changes from heat to cold,† and it is then too I believe that electric conditions are most changeable. It is not a peculiar soil or a peculiar condition of soil, for it is known in all soils, and where there is no soil, as on board-ship ; but here again Dr. Lorimer has given us interesting figured statements to shew that some soils favor its production : of 121 epidemic attacks 60 occurred on the black or cotton soil, 46 on the red soil, and 15 on various soils. It is curious to remark that the black soil is that where malaria is said to affect men most: this may depend upon a freer production, or because there is something in this soil which affects the functions of life, and thus it may increase pre-disposition to cholera as well as to fever. In fine, if we reflect upon the history of this disease, its prevalence in all countries and in all temperatures, when its invasion was epidemic, we must, I think, conclude either that it travels by human inter-communication, or that it must depend on a cause that under particular circumstances may come into operation in all situations. After much thought and reading, I cannot believe that the disease is ever produced by contagion, and by contagion I here mean any product of the human organism capable of exciting disease in another by direct contact, or through the medium of the atmosphere. I have shewn that the other reputed agents cannot be its source, but only media for its action; and I repeat my belief that electricity may be found to be the mysterious agent. The above remarks on the remote cause are perhaps somewhat out of place here, and may be considered more so when I express my intention of briefly noticing two other conjectures which have been offered on the subject of the proximate cause, or in other words in explanation of the symptoms. Mr. Assistant Surgeon J. P. Walker, now Civil Assistant Surgeon of Humeerpore, mentioned to me last year that while studying, and for a time teaching, anatomy in Aberdeen, his microscopical investigations had led him to the belief that cholera depended upon an abrasion of the epithelium from the mucous lining of the stomach and bowels. I forget whether he considered this as the effect or the cause of the watery exudation, but I recollect that he considered this immense abrasion of surface, acting like an external burn, might cause death and account for the symptoms. I regret much having mislaid a letter subsequently received from Dr. Walker, explaining his views;* but in the

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* See Jameson's Report on cholera, whereby it appears that literally in a few hours, and in different parts of the Marquis of Hastings' grand army, thousands of people were attacked.

* We do not know how or to what extent it is generated in the system, nor how external electrical conditions influence the organism, the great functions of sanguification and nutrition in particular.

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* "How far electricity may be concerned in all this it is difficult at present to say, but the discoveries which philosophers are daily making relative to the extensive operation of this fluid, for such I must call it till a better name be found, seem to encourage a suspicion that its agency is concerned in producing every change in the universe."—*Forster on the atmosphere.*

† Dr. Lorimer's statement on this subject is curious, but would not I think apply to our colder climate. It appears the per-centage of attacks to marches per cent is in cool and dry weather, 17.51 ; hot and dry weather 19.11 ; cool and rainy weather 35.95 ; hot and rainy weather 35.84 ; and in variable weather cold, hot and rainy, 68.42.

Theory of the disease depending on abraded epithelium.

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* Since the above was written, I have had the pleasure to receive a very interesting letter from Dr. Walker, which will be found appended to this chapter.

course of my references I find the circular of selections from the Calcutta Medical and Physical Society, for May 1840, to contain an extract from Heale's Retrospect of Pathology, from which it appears that the same view of the subject occurred to Dr. Bohm, the result of examining with the microscope cholera dejections and the intestines after death. The subject seems well worthy of further inquiry.

Professor Webb's theory of sulphuretted hydrogen and impaired endosmose.

Professor Webb has lately broached a theory, which would shew the remote cause, explain the symptoms, and teach the method of cure. I have not had the advantage of perusing the Professor's full exposition of his views, and therefore it does not become me to comment on them at length. In Dr. Edlin's Register, No. 2, I find the following extract from Mr. Webb's paper: "Cholera consists in general loss of the endosmotic faculty of the blood vesicles, and of the membranes and tissues, and consequent filtration outwards—endosmosis ceasing, all vital operations depending upon endosmosis cease also: ergo, the practice is, restore the normal state of the blood, membranes and tissues, and restrain by opium the mechanical filtration outwards; for Professor Mattenechi by experiment has shewn opium to have that curative effect—an effect directly opposed to that produced by the exciting cause of the disease, sulphuretted hydrogen." I presume to say that the Professor has yet to prove, what he here assumes as a fact, that sulphuretted hydrogen is indeed the exciting cause of cholera: the rest of the reasoning may therefore be left unnoticed.*

Notice of Mr. Parkes' late work on cholera.

I had just finished the foregoing remarks, and was sending them to press, when a friend sent me for perusal a work on cholera, which, according to my humble judgment, is second to no other that has ever appeared on the same subject, containing the result of much careful and minute anatomical inquiry, and full of ingenious reasoning.

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* I have seen hundreds of people frequenting pump rooms at watering places, where sulphuretted hydrogen stunk the very air. I never heard of a case of cholera so produced.

Observing the distinction so clearly laid down by the author himself, Mr. Parkes, between facts and the conjectural reasoning grounded upon them, I shall make a brief summary of what appears new in the morbid anatomy, and then notice the author's theory of the proximate cause.

*Morbid appearances described by Mr. Parkes.*—In the head there is nothing particular in the result of Mr. Parkes' cases.

Contains original views of the morbid anatomy.

*Lungs, examined in twenty-three Europeans and sixteen Asiatics.*—The average weight of the lungs appears from this statement to be lessened in cholera—the extent of the diminution, however, cannot be known, because the average weight of the lungs of adult Asiatics is not ascertained; and because Mr. Parkes supposes, and I believe with justice, that the lungs of all Europeans in India weigh less than in a cold country, I suppose because their functions are diminished. However, it cannot be supposed that the difference given by Mr. Parkes between cholera lungs and the average European standard, 17 to 20 ounces, could all be independent of the disease; and we shall come to other facts given in proof by him that the lungs are lighter.

Lightness and non-crepitation of the lungs.

*Summary of appearances in the lungs.*—"The most common appearances in the lungs are the presence of blood in the large vessels, chiefly or solely, the collapse, and the deficient crepitation arising from the more or less complete absence of air and blood, and from the approximation from some unknown cause of the molecules of the pulmonary substance.* In other cases there is more blood in the minute structure, a corresponding dark color of the lung, and a variable amount of frothy serum; the quantity of frothy serum bears an inverse ratio to the degree of collapse." Now I think it must be admitted that the weighment of the lung and its proved lightness is an original view of the morbid anatomy of cholera, and I am inclined to think the author is right in saying that by congestion of the lung described by authors to exist in cholera they could not have meant more than that the large trunks at the roots of the lungs are gorged with blood.* The flaccid and collapsed state of the lung I have myself noticed, and it has been recorded by others; but this author's is the first detailed and numerical statement to shew that a diminished quantity of blood in the tissue of the lung is almost invariably found after death, a collapse of these organs even more commonly; "and there was a total absence of crepitation in twenty-four cases, in the fifteen others it was notably diminished in some part of the lung, and in one of these cases abolished completely in the upper lobes." "The want of air," says the author, "was not owing to mechanical impediment, as on artificial respiration air passed readily in, distended the before collapsed lung, and partially or wholly restored the crepitation." In the heart the author's description of the morbid appearances presents no material difference from what others have given, though here, as elsewhere, he has gone into minute numerical detail, shewing us in how many cases the coronary veins were found turgid (the endocardium was always stained), how often the right cavities of the heart and the pulmonary arteries were full and dilated, the left and the aorta empty and contracted, &c.; from which we may infer that the general but not uniform appearance is as just stated.

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* I am not certain that I understand what Mr. Parkes means by the molecules of the pulmonary substance. If he means the air cells, perhaps their falling in may depend on the emptiness of the minute capillaries that ramify in health on one of their surfaces, and perhaps tend to keep them expanded.

Morbid appearances in the heart.

"The inference which was drawn from the state of the cavities in the greater number of cases was, that the right side has continued to receive blood till in some cases it became full and even distended, while the left side had received little or no blood, but had continued to contract in some cases even violently on the last drop of blood which had entered it." The following is the author's summary of the physical properties of cholera blood: "It appeared probable from all the observations that there was a deficiency in the quantity of fibrine, or a great tendency to the separation and deposition of this ingredient, that albumen and salts were present in undetermined quantity, and that the red particles were sometimes partly dissolved in the serum, but not in other cases appreciably altered in figure and appearance."* He adds in another place that the whole mass of blood appears to him more liquified than thickened.

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* This author and others have noticed frothy serum in the substance of the lungs, and the same mixed with white flaky matters in the smaller bronchical tubes.

Physical properties of cholera blood, given by Mr. Parkes.

Liver. *Summary.*—"There was some accumulation of blood in the larger branches of the vena portæ and hepatic vein, the gall bladder was moderately full, and the bile thick and viscid, but not stringy, as in some cases of dysentery."

State of the liver.

Spleen.—"Several writers, and among others Mr. Twining, have described the spleen as enlarged and congested. I have found this to be very seldom the case." Since we cannot doubt that Mr. Twining and Mr. Parkes both gave a fair record of their experience, we are surely justified in drawing the conclusion that no state of the spleen is distinctive of death by cholera.

Of the spleen.

Intestines.—The enlargement of the solitary and agminate glands is enlarged upon more than by most authors, and their peculiar morbid state in each separate number of cases minutely described. On these particulars I need not dwell, but proceed to state that the author admits the presence of the peculiar congee-like fluid as a constant appearance. It is singular to add, and it is confirmatory of a remark made by me some pages back of the unsatisfactory state of organic chemistry, that the author throws a doubt over the constant presence of the salts of the blood in the discharges, while on the other hand he seems to have detected fibrine in all his experiments in the insoluble flocculi often seen in the ejected matter, but more

Mr. Parkes' analysis of cholera discharges.

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* This is curious with reference to the supposition that these globules are the vehicles by which oxygen is carried from, and carbonic acid to the lungs.

constantly found in the small intestines after death. In the detection of fibrine Mr. Parkes is not singular or original, but other chemists have given as the result of their examination that this flocculent substance is mucus or abraded epithelium; such is the opinion of Andral, the eminent French pathologist.

Summary of his theory of the disease.

In the space which I propose to devote to the consideration of Mr. Parkes' theory of the disease, I am conscious that I may not be able to disclose his views fully, but I shall endeavour to do so fairly if I can. He believes that a poison alters the state of the fibrine of the blood, rendering it less soluble, and thus leading to a stagnation in the capillary circulation. In some cases where the deadly symptoms come on without any or with trifling watery exudation, he conceives that the stagnation is immediate and intense; in milder cases it admits of exudation of fibrine and the watery parts of the blood. This view of the subject carries along with it that the alvine and cutaneous discharges are not the first and most serious symptoms, that they are often absent in the worst cases, that the first diseased movement or effect is on the capillaries of the lungs, and that the heart's action ceases, because it receives no blood on its left side, not because its propelling power is over.*

Remarks thereon.

That at the stage when the disease must be called cholera (because the specific discharges have commenced) there is always impaired function of the lungs, appears to be an inference scarcely deducible from the history of the disease, or from the facts mentioned by the present author. He tells us of the warnings which had been given to the soldiers, whose cases he records, to make early report of sickness, and yet he states that in twenty-four cases (all he gives on this head) purging had been going on for an average of six and half hours before they reported themselves. The rational inference seems to be, and this is in conformity with my own experience, that they did not report themselves because, though purging, they felt no other ailment. I find the following passage corroborative of Mr.

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* The existence of salts in the blood is considered necessary to the process by which it endosmoses oxygen, and exosmoses carbonic acid.

Parkes' views in Dr. Carpenter's principles of human physiology: "In regard to its physical principles merely, it is easily shewn that a slight alteration of the blood may produce the most serious consequences; for a certain degree of viscidity has been found, by the experiments of Poisseuille, to favor the passage of fluids through capillary tubes, and thus if the viscidity of the blood be diminished by a loss of part of its fibrine, stagnation of the current and extravasation of a portion of the contents of the vessels will be the result."

It is not easy to imagine a poison acting so injuriously on the blood, without producing any apparent effect on the globules; and if we do admit, as perhaps we must, that there are cases of cholera where death arises without watery discharges, this does not upset my supposition that all the changes may depend upon nervous lesion, functional or organic, as the source. The dissection of a person dying very suddenly from cholera would be very interesting in the present state of the question: if then the lungs should be found collapsed, ex-sanguined and non-crepitant, we should be obliged to confess that death began there; my own belief is that in such cases it begins at the heart. I can by no means agree with Mr. Parkes, that the heart's action in this disease is affected always according to the state of the circulation in the lungs, since I have seen numerous cases where the pulse could not be felt, while the other chest symptoms were not urgent, and where indeed the lungs must have been performing a moderate amount of function. Second to the alvine evacuation, the altered and almost always weakened action of the heart has ever appeared to me the next symptom. Admitting the possibility of cholera without evacuation, it is also true that there are many more cases where we can detect no symptom of pulmonary affection.

It seems to me that it can scarcely be the correct theory of the disease, which only accounts for the symptoms and appearances in the fatal cases.*

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* In a report which it was once my duty to forward to the

### PRE-DISPOSING CAUSES.

Practical observations on the pre-disposing causes of cholera.

The pre-disposing causes of cholera, or those which make the body susceptible to the remote cause, or admit of the symptoms being produced, are numerous and of varied character.

Remote cause usually not very active.

Requiring the co-operation of pre-disposing ones, such as food, accommodation and ventilation.

At other times the remote cause seems more active.

Classes of society most subject to the disease.

It would seem a fair inference, from what we observe of cholera, that the remote cause is in ordinary visitations not very active. It usually attacks those who are much exposed to out-door vicissitudes and to inordinate fatigue, who live badly, and who occupy bad houses and ill-ventilated or tainted localities. At other times again the remote cause seems more active, so that those are attacked who do not expose themselves or endure fatigue, who live well but temperately, and who inhabit cool, well-raised and well-ventilated houses. The exposed, ill-fed, laboring class of natives are most subject to cholera, and especially such of them as sleep exposed to the night air,* or in low, ill-ventilated huts; and the same class of the population commit the greatest errors in diet. It is a curious question how particular diet can pre-dispose to the disease. There are some indeed who do not draw the distinction between a remote and a pre-disposing cause, but directly attribute the production of the disease to particular diets or drinks; some to water-melons, some to sable fish, others to the use of toddy. Now in some years natives may eat any quantity of vegetables

Question how diet can pre-dispose to cholera.

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Medical Board, descriptive of a dreadful visitation of cholera in the jail of Tirhoot, of which I have no copy, I had occasion to notice what was to me a very wonderful modification of symptoms, and it occurred in several cases. After a check had been put to the vomiting and purging, the voice, breathing and warmth of skin became natural, the face had none of the peculiar character of the disease, the patients walked about and called for food, saying they felt well; on feeling the pulse in these cases, it was barely perceptible—I think in some cases not to be felt at all. In this extraordinary condition some of the men lived for more than two days; they all died, and if my memory serves me invariably by coma.

* Exposure to night air is a well recognised pre-disposing cause, and the remark that most attacks come on towards morning is correct. Mr. Edwards has proved that there is diminished production of animal heat during sleep.

or fish, and European soldiers drink any quantity of toddy, without either producing cholera. This, and the circumstance of one having three causes for one effect, shews that they are merely pre-disposing: they act in different ways, but in all derange some functions, so as to lower the tone of the constitution by which external mal-influences are resisted.*

Effect of some purgatives.

We are told by many observers of the aptness of saline purgatives to induce cholera.

Here again, unless cholera be merely derangement of functions, independent of external causes, we cannot account for the disease being thus produced, but by supposing that it renders the individual susceptible. The remote or essential cause might be present, but it would not have caused the disease, if he had not taken the purgative.

Pre-disposing causes among European soldiers.

The liability of the European soldier to the invasions of this disease at seasons when his officers are exempt, is another illustration of the nature of the pre-disposing causes, and shews us, I think, that the remote cause is not usually very active, and perhaps we may add that it is very local in its action.†

The exposure, the crude diet, the over-stimulation, and subsequent debility, from the use of spirits or toddy, the chills from sudden blasts of wind when in a state of perspiration, the over-crowding of barracks, and the consequent inhalation of impure air—all these pre-dispose to the disease, but will not produce it, unless the essential cause be present, any more than they would produce small-pox, measles, or scarletina, without infection.

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* See in volume iii., of the American Journal of Medical Sciences, excellent reasoning on this subject by Dr. Caldwell, in his prize essay on malaria.

† After the distribution of 15,000 rupees of prize-money to the 14th Regiment, at Berhampore, ninety-four cases of cholera appeared within a few days.

Bad ventilation and filthy localities seem to harbour the remote cause.

When I mention bad ventilation and exceptionable sites as pre-disposing causes, I ought to add that the remote cause seems to affect such places more than those of an opposite character: in short we may have the remote and the exciting cause existing separately, without individuals being attacked. Bring them together and we have a victim; have the remote cause very intense, and we hardly require a pre-disposing one.

These remarks are offered in order to illustrate familiarly what should be the usual precautions against cholera, and they will shew also that at the worst seasons of the year, and during violent out-breaks, an increased observance of precautionary measures is advisable.

### TREATMENT OF CHOLERA.

"*Bis dat qui cito dat.*"

"A stitch in time saves nine."

Many cases beyond the power of medical art, but others curable if attacked early with a bold hand.

If it is true that we meet with many cases of cholera (and that especially during the first few days of an epidemic visitation) which are quite beyond the power of the medical art, let it also be remembered that the disease very often steals on insidiously, and slowly, while it is yet amenable to treatment, so that a careful and watchful observation, and a bold hand in prescribing, may save many from an awful death.

Comments on Mr. Searle's views of treatment. Believed to be dangerous, because the discharges are considered salutary efforts.

Being confident of the correctness of this view of the subject (the result of long experience, borne out fully by the testimony of some of the best authors in this country and in Europe), I find it difficult to notice calmly Mr. Searle's views, as contained in his late publication on this disease. His work is evidently considered by himself, and we must believe by his patrons too, to contain matter which is new and instructive to the medical service in India. New it may be, but instructive it certainly is not. It in fact contains highly dangerous doctrine, where it sets forth that the evacuations are salutary efforts of nature, and ought to be encouraged; and, in condemning the use of opium, he would deprive us of our surest means for their arrest, and, as I think, for much more than this.

And the use of opium is condemned.

When the disease prevailed in Europe, a host of observers concurred in the sentiment that cholera was often preceded by diarrhœa, to check which was to save the patient from an attack. The observation is not so generally applicable to the disease in India, but experience has taught me that in this climate it is always wise to stop a looseness at the seasons of the year when cholera appears, and more especially if we have heard of any cases having recently occurred. To do this there is nothing so certain as a dose of from thirty to sixty drops of laudanum, and we may afterwards, by suitable treatment, remove any cause upon which the irritation depended. I believe that when the calls to stool are sudden, and unusually profuse, we may be more suspicious; and when they are accompanied or followed by symptoms of nervous prostration, exhaustion, faintness, nausea, precordial anxiety, or ringing in the ears, our alarm should be aroused.* We must give the laudanum after every evacuation till we stop them; rest and abstinence from all ingesta must be enjoined, and after some time, say in from twelve to eighteen hours, a mild warm purge should be given. It may be combined with a carminative.†

The great indication is to stop the first discharges.

Best done by opium.

Author's practice to check all bowel complaints at seasons when cholera prevails.

Manner of doing so.

In all ordinary cases the disease may fairly be pronounced cholera, when the congee discharges appear. It is true that

Division of cholera cases under four conditions.

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* The occurrence of spasm will enhance the likelihood that we have an incipient case of cholera to deal with. This symptom when present usually co-exists with the stage when free evacuations are going on, and subsides as they do; but it is by no means a constant symptom even then. It appears to me strongly corroborative of the idea that the essential functional derangement of cholera takes place in the abdomen, that diarrhœa often precedes its appearance, and that during epidemic invasions stomach and bowel derangements often prevail.

† A tea-spoonful or more of Gregory's powder in 2 ounces of peppermint or cinnamon water,—or 10 to 15 grains extract colocynth, with 3 or 4 drops of one of the essential oils; if there is loss of appetite and tone, vegetable bitters may be given for some days.

Colliquative, anœmic, asthenic and reactive.

in a few instances, and these often the most fatal, they are absent altogether. Bearing this in mind, and proceeding to consider the treatment of cholera, we shall have to deal with it in one of the four following conditions: to each of these I shall venture to give a name, not sure of their critical accuracy, but believing that doing so will be practically useful.

The four conditions defined.

1st. The colliquative condition, where the discharges are distinctive and specific, but no impression yet made on the general circulation: there may, or may not, be some symptoms of nervous depression.

2nd. The anœmic condition, where, after discharges more or less free, the heart's action has become affected, with other general symptoms, which will be noticed.

3rd. The asthenic condition, where the symptoms of intense congestion and collapse have come on without previous vomiting or purging.

4th. The reactive condition, which will include the symptoms requiring treatment after the state of collapse is followed by one of reaction.

Treatment of colliquative condition—great value of time.

*Treatment of colliquative condition.*—We are to bear in mind that minutes may almost be called hours here; that the tendency of the case almost always is to run on to speedy collapse; while there is an immense mass of proof that in this stage of cholera medicine has a powerful effect in diminishing mortality. It is well established, independent of all theories of the disease, that the indication is to stop the vomiting and purging, by doing which we usually, but not always, arrest the disease. It is not one of the least curious features of this

Blood-letting.

wonderful ailment, that the effect of blood-letting should not only depend on the period of the attack when we use the lancet, but upon the character of an individual epidemic. We shall find that in some invasions of cholera, in the condition of

Effects of differ in different epidemics.

the disease now under consideration, a full bleeding will at once stop the vomiting and purging; in others again it will be followed by collapse. I am myself generally disinclined to bleed, unless the pulse be full and laboring, and there is at the same time an urgent sense of oppression about the chest and precordia; jactitation and anxiety often accompany this condition; and if the cramps are urgent, it is an additional reason for bleeding. We must watch closely the effect on the pulse, and desist immediately if we find it sinking. "I do not know," says Mr. Parkes, after stating that he had seen it decidedly useful in some cases, "how to account for the efficacy of blood-letting, unless it relieves congestion to some extent, and also produces a beneficial effect by removing a portion of the vitiated circulating fluid;" or, as Dr Copland suggests, it may help the weakened propelling powers by diminishing the mass. If we refer to the writings of the earlier authors on cholera, we shall find that the character of the disease has greatly altered, from one usually exhibiting strong vascular action and vital powers, to one where the movements of organic life appear to be often overpowered from the on-set. It is only in this way we can explain the change of opinion which has taken place on the subject of taking blood in cholera. At the present time even, when we bleed under the circumstances I have stated, we may sometimes have to regret it.*

General indications for bleeding.

Bleeding not so successful now as formerly.

The remedy I have next to notice has ever appeared to me that upon which we may place most reliance in this the colliquative, or, as some call it, the premonitory stage.

Opium holds a place more or less prominent among the prescriptions of almost every practitioner in the treatment of cholera;

Opium.

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* Although it is true that the character of cholera has changed with reference to bleeding as a remedy, and that even now some epidemics bear it better than others, we must expect to find individual exceptions to all such general observations, considering how limited our means of cure are. I believe it is good advice to suggest that we should always try bleeding in the first cases of a fresh out-break, of course the earlier the better; our care cannot be too great to detect the first symptoms of inanition. If under such favorable circumstances bleeding is not found to answer, we should leave it off during that epidemic. Natives scarcely ever bear bleeding.

Used in some way by most practitioners.

How it is supposed to act.

whether it acts merely by checking the peristaltic movement, or, added to that, it soothes nervous commotion, and, according to Mattencchi, the eminent Italian physiologist, it has a specific effect in preventing exosmose, it has held its ground since 1817, and it holds it yet as the chief remedy to stop the vomiting and purging. For these symptoms occurring in other diseases, I believe all observers will agree that opium is one of our most certain prescriptions; and if I can shew that to check the same symptoms in cholera be indeed an important indication, I believe my case in favor of opium will be made out. I might quote what would fill a volume in proof, that in the condition of disease I am now considering the great hope of cure rests in stopping the vomiting and purging; but I satisfy myself with quoting Mr. Parkes' distinct and candid acknowledgment to this effect, although evidently aware that it goes somewhat to shake the foundation of his theory. "It may, I think, be satisfactorily proved that the arrest of the watery elimination in the cases of inferior intensity is attended on the whole by positive and undeniable benefit.* This is most unequivocally shewn, by observing the progress "of cases left altogether to nature," and again, "the great indication in this period is to prevent the passage of fluid from the alimentary mucous membrane and from the skin."

Must be useful if it is an indication to check the vomiting and purging.

And such the general opinion.

Other remedies appear to prove useful on the same principle.

I believe it is on the same principle that so many remedies have acquired a reputation in the cure of cholera: stimulants, carminatives, anti-spasmodics, &c.; that is, by arresting the watery exudation, some assert that, as they only act after absorption, they cannot avail after the power of absorption has ceased; but I do not believe it is proved that they only act by absorption; and what observer can tell when the power of absorption has ceased or yet continues? But it is certain that, either owing to a diminished absorbing power, or to a deaden-

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* It would seem an undeniable inference from this, that whatever the original cause producing the disease, it is upon changes occurring in the system itself that the fatal issue depends.

Large doses of all medicines required in cholera.

ed nervous sensibility, much larger doses of medicines may be given as the disease advances; and even in the condition of the disease now being considered, our doses must be full and freely repeated till our object is accomplished—three grains of opium, or sixty minims of laudanum, (the latter in preference) except where the stomach is very irritable. When, and upon what considerations to repeat the doses, requires the exercise of as much decision and discriminative judgment as any situation I am acquainted with: by giving the next dose we may induce vomiting, and thus lose what the first may have effected; by delaying it collapse may steal its march upon us; and by giving too much we may induce narcotism. Dr. Christison tells us that the narcotic effects of opium are not usually to be expected after an hour. Till our patient is free from all vomiting and purging, we should repeat the doses every hour at least, regulating the amount by the state of the sensorium; a dose rejected should immediately be repeated, and if we find the pulse failing, and the other symptoms of collapse advancing, that too should hurry our proceedings. In the colliquative stage of cholera, where, according to my definition of it, the pulse continues firm, I do not believe we need often fear head symptoms from opium. I believe it is at any rate correct, as a general observation, to say that, when it narcotizes, our patient will generally be saved; if not we must avoid overpowering the brain by continuing it, and try the effect of other remedies.*

Practical rules for the use of opium.

ASTRINGENTS.

Astringents.

The acetate of lead by the mouth, or other mineral astringents, I have not myself tried; as recommended by Dr. Graves, of Dublin, (the prescription is given below)† we have the strong testimony of that sagacious physician in its favor; and Mr. Parkes also recommends it.

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* When the stomach is very irritable morphia may be given in preference; its smaller bulk recommends it: and when I had the disease myself, it certainly seemed to act much more quickly than opium or laudanum.

† A scruple of acetate of lead, combined with one grain of opi-

### COUNTER-IRRITATION.

Counter-irritation.

When we know the disease we have to deal with, and where the symptoms are leading to, we should always use counter-irritation: it will often relieve the immediate symptoms, and it will lessen the tendency to collapse—the mustard sinapism is especially useful in this particular condition.

### PURGATIVES AND EMETICS.

Purgatives and emetics.

With the views I entertain regarding the treatment of the colliquative condition in cholera, I may be content with saying that neither purgatives nor emetics are advisable.

### CALOMEL.

Calomel.

From its known sedative action on the stomach, I often give calomel in twenty-grain doses, combined with the opium. I have no hope of its acting on the liver suddenly, or until the morbid discharges have been completely suppressed for a considerable time.

### ENEMATA.

Enemata.

Astringent enemata, alum, or lead with laudanum, are, I think, worthy of trial; the quantity of fluid should be moderate—6 to 8 ounces—as we wish it to be retained.

### DRINK.

Drink.

We will deal more fully elsewhere with the subject of allowing drink in cholera. In this stage of the disease thirst, if present, will not be very unbearable; and as our object is to quiet all alvine movement, the use of any liquid is not advisable. When we have to give any thing, it should be a little weak brandy and water, or a glass of soda water with a tea

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um, divided into twelve pills; of these one to be given every half hour, until the rice-water discharges begin to diminish, when the intervals between each pill may be prolonged. Dr. Graves says he has given 40 grains often in 24 hours.

spoonful of brandy, or water holding a moderate quantity of ginger or pepper in solution; water acidulated with nitric acid is a very agreeable drink, and sits lightly on the stomach.

### TREATMENT OF THE ANŒMIC CONDITION.

Treatment of anœmic condition.

As I wished the colliquative condition to mean where the discharges were specific, without any marked grave constitutional symptom, and as under the asthenic condition I only intend to include the rare cases in which there is neither vomiting nor purging, it will be obvious that under the present category will come the great majority of cases of cholera. Many writers assert that the pulse is always more or less affected, and Sir James Annesley, in his work on the disease, has described the symptoms that mark, what he calls, the period of invasion. The result of my own observation induces me to say that there are cases where the rice discharges are not preceded by any notable change in the circulation, nor by any other constant symptom. Most commonly, however, besides other warning symptoms, we find the pulse affected from the first, and its condition is our surest guide to the safety or danger of our patient. It is variously affected, from the first weakened impression to the finger till it ceases to be felt altogether; but blood evidently circulates for a long time after the pulse is imperceptible—weakness, quickness, irregularity are all bad signs. Other grave symptoms soon follow any considerable disorder of the circulation: cold clammy sweats, dyspnœa, aphonia, violent jactitation, intense thirst scarcely appeased by drinks, a sense of inward heat, a shrivelled cold surface,* dimness of the eyes, brilliancy, and the dark sunk ring round them, appear in varied shades of severity, and in periods of time differing greatly in different cases, end in death, or are overcome; while many linger long ere the fatal termination takes place—few recover, unless the graver symptoms are speedily overcome or removed.

Most cases come under this category.

Various conditions of the pulse.

Other grave symptoms.

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* Blueness of the whole surface is an occasional appearance; more commonly this appearance is confined to the neck and chest. It is always, according to its extent, indicative of extreme danger.

Rate of mortality.

Before proceeding to consider the treatment I think best in the different phases of this condition of the disease, I wish to offer a few observations relative to the general rate of mortality, and to remark upon the chief symptoms with reference to what we may expect from the efforts of nature or from remedial measures. I neither agree with those who put a strong faith in medicine, nor with those altogether sceptical of its powers. The numerical method will not help us here to discover the best kind of treatment, for the severity of epidemics varies exceedingly; and the sanguine and self sufficient, who thinks his method infallible, will anon receive his lesson. In our worst epidemics few of the first cases are saved; but though this is true as a general rule there are exceptions to it; as I myself have seen an outbreak gradually increase in virulence, and then suddenly cease altogether. In the worst invasions two deaths out of three attacked may be stated as the rate of mortality—an ordinary rate may be stated to be one death to one recovery: and though we have many degrees of mortality lower than this, the disease I do not think is ever known, at the present time, to shew so low a rate of mortality as was described by the earlier authors when one saved 98 cases out of 100, another 88 out of 90.* Perhaps this is the strongest argument in favor of a poison being the cause, rather than any atmospheric condition alone.

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* Return from Kurrachee.

| Admissions. | Died. | Recovered. |
|---|---|---|
| Of the 1st 100 | 79 | 21 |
| ,, 2nd 100 | 66 | 34 |
| ,, 3rd 100 | 50 | 50 |
| ,, 4th 100 | 40 | 60 |
| Admissions, 400 | Deaths, 235 | 165 Recoveries. |

North-Western Provinces, including three regiments in the Hills 1845 :—

| Admissions. | Discharged. | Died. |
|---|---|---|
| 909 | 517 | 402 |

See page 277, volume 1st, of Mason, Good and Annesley's works, in proof of the lower rate of mortality in former times.

General remarks upon the symptoms in the anæmic condition.

With regard to the more serious symptoms of cholera, I may remark first that the lowered power of the heart's action, in the various degrees we witness, must, I think, be considered that which indicates the tendency to death—that tendency varying according to the degree in which the circulation is lowered. Looking to the other chest symptoms, on what do the dyspnœa and loss of voice depend? If we reasoned only from the great majority of cases, and from the effect which liquifying the blood produces, we would feel inclined to believe that the chest symptoms depended upon the thickened state of the blood. Against this view of the subject I do not think Mr. Parkes' argument quite conclusive, that the severity of the chest symptoms is not always in proportion to the amount of the discharges—he thinks the converse holds true. The first proposition, if correct, (and I believe it is) might depend on peculiarity of constitution; the second is more difficult of explanation, but it might be owing to the immediate paralysing effect of the essential cause of the disease. Mr. Parkes considers the capillaries of the lungs to be independently and originally affected, and that thus, oxygenation and decarbonization ceasing, the heart is not duly stimulated, and the blood diseased, its water exosmoses from the open surfaces. I have stated reasons against this view. I believe it certain that the heart's movements are affected often, at any rate before any signs of impaired action are discoverable in the lungs.*

To the symptoms mentioned, when we add the deadly cold, the shrunk and sometimes blue skin, the cold tongue, (a very diagnostic symptom) and the profuse sweating, we may wonder how it is that any patient can recover from a state so nearly allied to the stoppage of the functions upon which life depends. If the heart stops altogether death is immediate; here, wonderful to say, it is all but stopped for hours, and yet recovery often takes place. If the air be entirely excluded from the lungs, death is sure and speedy. Here it would seem that for hours, nay for days, a small, and but a small, quantity of oxygen is absorbed; yet occasionally, and by functional means, —of which we may acknowledge total ignorance—the result will be recovery. Perhaps we have no such instance of the working of the vis medicatrix naturæ as her occasional victory in so fearful a combat.

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* It seems to me that, if diseased action commenced at the lungs, the heart would propel dark blood earlier; it is only after it has ceased to act with any force that it does so. In cases of violent death taking place from want of air, the action of the heart continues strong to the last.

Indications of treatment: 1st. to stop the discharges—2nd, to increase the strength of the pulse—3rd, to relieve the lungs—and 4th, to restore the heat of skin.

If we reflect upon the recorded efficacy of blood-letting in former times, and contrast that with the opinion of many present observers, it would seem that the remote cause has increased in virulence, and that blood-letting must have formerly acted beneficially by relieving the circulation, thus enabling the various organs and tissues to continue their action till the tendency to death was overcome; we may understand the matter better by supposing a three-weeks' bad case of European typhus condensed into a few hours. But to drop these speculations, and to proceed to consider the treatment, perhaps there is no better way of arranging our proceedings than to say we wish to stop the vomiting and purging, to increase the strength of the pulse, to relieve the lungs, and restore the heat of skin.

Treatment for 1st indication, to stop the discharges.

Opium must now usually be combined with stimulants.

After the circulation is considerably affected, experience proves that many cases may yet be saved by arresting the watery exudation, and, according to the lesser intensity of the other bad symptoms, should this continue to be a chief object, I have already mentioned opium as the medicine I have myself found most useful for this purpose;* but here we are warned of the tendency to coma as contra-indicating it. And certainly we do well to combine it with stimulants—hartshorn, camphor, æther, or brandy. If it could be done, few things would interest me more than to obtain a series of cases treated with and without opium, and to compare the results, not only as to

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* We must always inquire of natives whether they are habitual opium eaters, or consumers of other narcotics.

Practical remarks.

Stimulants.

Repetition of doses.

the mortality, but as to the number of fatal cases from head affection. I shall presently have to notice the immense quantities of opium that may sometimes be given without affecting the head. In exhibiting remedies for the arrest of the vomiting and purging in this condition of cholera, we have the difficulty I have already noticed—that, if the stomach is irritable, in repeating a dose we may lose part of the effect of the last one: some of these niceties must always be left to the judgment of the individual practitioner. But here we must not give too much thought to the fear of vomiting; for if the pulse is failing us, and other bad symptoms progressing, we must go on with our sedatives and stimulants combined, never forgetting that if the pulse once becomes imperceptible it seldom returns—that after it has ceased to be felt for three hours we need hardly expect it. The 20-grain dose of calomel is often useful, combined with opium or laudanum, as already mentioned; I have no faith in its action on the liver till we have stopped the specific disease. I think all doses in this disease should be given with reference to the above consideration; but the period for repetition must of course partly depend on the strength of our doses.* We are all inclined to follow to a certain extent the precepts we have first received; but with respect to stimulants in particular, it has occurred to me that their almost continued exhibition in small doses would be preferable to our present plan. Unless there is manifest impression made on the disease, we should at any rate repeat our doses once in the hour, (oftener, if it is advancing) persevering with the opium combined with liquor ammoniae aromat, or some of the other diffusible stimulants, till we find the head will no longer bear it. It is then that, for the particular indication of checking the purging, astringents of various kinds may be combined with stimulants, antispasmodics, or carminatives, such as cam-

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* On the principle that the effect of remedies often depends on individual constitution, it may be well to change our remedies when we do not find them answer.

Notice of various other remedies.

phor, peppermint, black and red pepper, asafœtida, ginger, &c., which have occasionally been so successful on a large scale as to obtain the character of specifics, to lose it again during the next epidemic; astringent enemata* of sugar of lead or alum combined with laudanum may be used for the present indication. Dr. Goodeve informs me that, on the dissection of some cases thus treated, he found the lower part of the large intestines considerably contracted, proving their astringent action. After the pulse becomes much reduced, and the skin cold, warm saline enemata will be more advisable.

Question how long we should continue to try to stop the discharges.

The question may now be put, how long are we to persevere in our attempts to stop the discharges? Many writers will tell us that, after the pulse has ceased to be felt for some time, with the other symptoms of extreme collapse, all such attempts are useless.† Mr. Parkes goes further, and expresses a belief that we had now better leave nature to her own wonderful resources—that interference in the present state of our knowledge is absolutely pernicious. If one were convinced of the correctness of this view, it would be his duty to act upon it, even at the sacrifice of some reputation. The difficulty of knowing when medicine ceases altogether to be absorbed, and the consideration that some medicines act by a direct impression on the mucous lining, incline me to think that we should persevere to the last. Many of the readers of this publication will be acquainted with Dr. Macgregor's plan of treating cholera, by quickly repeated doses of opium and croton oil. Though

Author's reason for thinking we ought to persevere.

Treatment by croton oil and opium alluded to.

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* If we give enemata to produce a local action, it may be well to mention that about a pint and a half will lubricate the large intestine; but giving them in such large bulk they are less likely to be retained: experience teaches us that sedatives applied to the end of the rectum, soothe the whole track of the canal. Mr. Hare has lately stated that the large intestines will hold six pints.

† We may have re-action established, and the discharges yet continue, but this is rare; a far more common condition is that collapse continues after the discharges have ceased. In the first case we must persist to try to check the discharges, in the second our indication is to establish re-action.

dissatisfied as they must have been with the reasoning upon which he grounded the use of it, the record of success which he offered must have induced some to give it a trial. I have done so, and though I have not found it the almost specific it was said to be, 'till Dr. Macgregor himself found it fail, the result of two cases in particular has led me to the conclusion that we may give much larger doses of medicine in cholera than has hitherto been done. I must add that I consider Dr. Macgregor's remedy worthy of further trial, and that I suspect it has very seldom been given in the exact manner he recommends it.

Cases given of this treatment.

In October 1844, while in medical charge of the 1st Regt. Native Infantry at Dinapore, I had daily to visit the jail hospital of Patna during the illness of the Civil Surgeon. One morning, just as I was leaving the regimental hospital to proceed to Patna, an old Havildar presented himself, complaining that he had bad bowel complaint during the night—he had no other sign of cholera; I ordered him an opiate, and, suspecting that the case might run on to cholera, on my way through cantonments I arranged that he should be seen twice during the day by other medical officers. On my return in the afternoon I found him in a state of intense collapse, although all the usual means had been resorted to, and I had no hope whatever of his recovery. The opium and croton oil pills were now given. I saw him again about ten p. m., when there was a decided improvement—the vomiting and purging had ceased, and he had slight symptoms of re-action; the pills were continued at longer intervals during the night, and next morning I found that the deadly symptoms had left him. He had taken no less than twenty-seven grains of opium and forty-five drop of croton oil in twelve hours; there was no stupefaction, and after a great struggle through a typhoid gastro enterite the man recovered.

Case 1st.

Case 2nd.

The second case occurred at this station (Cawnpore) in May 1845, since which time I have happily had no opportunity of testing the remedy. Early one morning a man was brought to my house laboring under marked symptoms of cholera, but without much collapse. I treated him during the day in one of my out-houses with all the usual remedies—calomel, opium, ammonia, &c., but by bed-time at night his condition seemed hopeless. I directed my native doctor to give the croton oil and opium every half hour ’till death or a more gratifying and less expected change took place ; in the latter case the pills were to be continued at longer intervals. Next morning the patient was not only alive, but decidedly better. He had taken thirty-three grains of opium and fifty-five drops of oil, and he recovered without a head symptom. So far from the oil acting as a purgative, it was necessary to give strong doses of other aperients, and so intense and characteristic was the case that it was three days before any urine was secreted.

I had not concluded this brief record of these two cases, before this dire disease again has appeared at this station. The first case was the wife of my native doctor—I sent him to his home with a scruple of calomel, one drachm of laudanum, and some of the pills, directing him to give the calomel and laudanum the first trial. This appears to have been a mild case : the calomel and laudanum were rejected, but the first pill stopped the vomiting and purging, and she recovered. Four other cases occurred during the same day in that neighbourhood—all recovered, having had from one to three pills. On theevening of the same day, at 7 P. M. 24th May 1848, I saw the bearer of a staff officer at the station ; he had been ill since 11 A. M. and was now pulseless, with a cold clammy skin, cold tongue, a sunk eye, intense thirst, and some loss of voice ; the breathing was little affected. He had been seen by the native doctor at four, had rejected two pills, and a third had just been given. From this time the vomiting and purging ceased—up to 9 o’clock he had taken and retained three pills ; the other symptoms being unchanged, a pill was given every half hour ’till half past eleven, when, as I am told, re-action having come on, they were discontinued till 5 A. M., when having again vomited he got one pill. I saw him at ½ past 5;* he was still in a very precarious condition. The purging had completely stopped, but there were occasional regorgitating actions of the stomach, occasioned by his incessantly desiring drink which was not withheld. The countenance had decidedly improved, the breathing was free, and the chest sounded well on percussion. The skin was dry and warm, the tongue still cold, no pulse yet. During the day intense thirst, allayed most by the cold affusion and by small doses of magnesia given in milk, was the most urgent symptom. He was not going back, but if any thing improving. A slight thrill of arterial action could be felt occasionally, and the stethescope proved that the heart was acting with some power. Ammonia and brandy were given freely, sinapisms were applied several times to the pit of the stomach, and a little sago, or milk, or congee was given occasionally. On the third day he had improved greatly, having had some feculent motions, the effect of calomel and castor oil; and he passed urine on the second morning after the attack began. This man also recovered.

I may notice here, how the present outbreak is corroborative of the observations offered in the second chapter, as to the connexion which exists between unusual conditions of the weather and the appearance of cholera. This station has for two years been perfectly exempt from cholera during the hot months and no rain fell. This year I foretold its appearance, when we had falls of rain and very changeable weather during these months. From the detail just offered it is surely warrantable at any rate to infer that we may give large doses of these two medicines combined in the disease now under notice, and that so given they seem as successful as any other prescription in the stage of collapse. Whether the first circumstance depends on a modified effect of these medicines from

Deductive from the result of these cases.

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* Up to that time from 7 P. M. of the previous evening he had taken 18 grains of opium and 27 drops of croton oil; each pill by mistake had only 2 grains opium and 4 drops of the oil.

their combination, seems a question worthy of further inquiry. It is singular enough that while in the very act of dealing with this question, a case has occurred to me which seems to prove that it is owing to the state of collapse, the almost stoppage of the circulation, that such large doses are admissible. A boy, six years of age, was brought to my door with well marked symptoms of cholera; but the pulse was yet full and good. He had one grain opium and 1½ drop of croton oil. He vomited soon after, but the pill was said to have been retained: in half an hour he had another cholera stool, when the dose was repeated. From this time the vomiting and purging ceased, but he was intensely narcotized. Strong green tea and ammonia were given, and cold water dashed on the face occasionally: consciousness returned slowly, and he is now quite well.*

Treatment of 2nd indication, to increase the heart's action.

The second indication, namely to increase the action of the heart, considered separately from the others need not detain us, for this desirable object is only to be obtained by stimulants, by such medicines as determine to the skin, or by the injection of saline substances;† and each of these measures has notice elsewhere.

Treatment of 3rd indication, to relieve the lungs.

The next indication of treatment is the relief of the lungs from the dreadful sense of oppression. In the early history of cholera this object (but I may here remark that we meet with many cases where thoracic oppression is not present) was usually obtained effectually and safely by the lancet.

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* The day after recording this boy's case, I had another boy about the same age brought to me in a very similar condition. As the pulse was still good I gave calomel and laudanum; but two doses not having the desired effect, he had one grain opium with one and half drop croton oil. It was necessary to give a second dose; this happened yesterday, 29th May. I saw him this morning 30th, free from all bad symptoms, save suppression of urine.

† The largest scale upon which the injection of saline liquids was ever tried, was I believe by Dr. MacIntosh—out of 156 cases twenty-five recovered. We must not forget that it was only used in the most desperate cases. The liability to plehetis scarce merits consideration in so fearful a condition of disease. Mr. Parkes added albumen to the injected fluid; but his cases were not successful, though usually attended with temporary benefit.

Remarks on blood-letting and the changed character of the disease.

Artificial respiration and inhalation of gases.

Injection of saline fluids into the veins.

Near approach to a cure, and great discovery.

Apparent reason of failure.

It would seem indeed, from a perusal of the first authors on the disease, that the present early and mortal depression of the functions is an addition to the essentiality of cholera.* We had then the well marked disease, the rice discharges, the cramps, the thoracic oppression, &c.; but they were accompanied by a state of the system that bore bleeding and purging, and the cures were proportionate: now we have often a disease which almost from the first is accompanied by weakened action of the heart, and where purging by medicine seems by common consent to be abandoned till the stage of re-action. The relief of the pulmonary oppression is seldom effected now by bleeding in the common run of cases: if we can restore the circulation it usually follows that we relieve the lungs also. Attempts have been made upon the disease through the lungs themselves, by maintaining artificial respiration, inhaling oxygen, &c. Sad to say these only require a passing notice as ingenious proposals having had no practical result. The injection into the veins of water holding the salts of the blood in solution I have already alluded to; and I was justified in saying that it came near an immortal discovery, for in truth the immediate effect is all but miraculous. We see a blue, ghastly, shrivelled, pulseless, speechless, dying man restored, as it were by magic, to a comparative state of health; but the fluid passes off by the intestines, and the improvement is, alas! usually but transient. It would seem from the result that the exudation is the original disease, and that the failure of the circulation and the function of the lungs result from it; for as soon as the exuded liquid is replaced the heart acts again, and the lungs begin to absorb oxygen: the liquid again exudes, and the vital actions alluded to again cease to be performed. It seems that we only want to prevent the exudation to effect a cure. It does not occur to me that opium stimulants or astringents have been tried by the mouth at the same time with the injections.

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* The reader will recollect I am treating of the condition subsequent to profuse discharges; the collapse without them has presently to be noticed.

Suggestions.

A friend has lately suggested to me that opium might be added to the injected fluid; I am not aware that this has ever been done. There are, it must be noticed, some cases on record where death occurred by coma after saline injection.

Cold effusion and use of ice.

Treatment of 4th indication, to restore heat of skin.

Use of emetics.

It is not one of the least singular features of this inexplicable disease, that laboring under symptoms such as I have described the patient should derive wonderful relief from the cold effusion, and even from the application of ice to the surface of the body. I have seen a person blue and pulseless express the greatest sense of relief by having quantities of cold water poured over him, and pat his chest in significance of his wish to have it continued: I have heard of its bringing on reaction, but I have not myself seen that effect from it. Mr. Parkes suggests that it may act by its effect on the muscles of respiration. It has a powerful effect on the nervous system generally:* the use of ice was highly extolled by some American writers. To accomplish the indication of restoring the heat of skin, various measures have been suggested; hot and vapour baths, rubefacients, sinapisms, heated bran bags, hot bricks, &c.; perhaps the mustard poultice is the best of all: but the limbs may at the same time be rubbed with hot turpentine, or the liniment recommended by Dr. Copland given below.† I have often thought dry powdered ginger useful in checking the cold perspiration. The hot water bath is too exhausting, the hot air or vapour bath should be used when available. Many practical writers have stated their conviction that emetics are

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* I observe that the wonderful new agent chloroform has been tried in advanced stages of cholera. The result might, I think, have been anticipated. Perhaps it will be found useful if applied early, by its wonderful effect over the nervous system coming into action before the functions of organic life are seriously involved.

| | | |
|---|---|---|
| † Liquid Ammonia, | .. .. | 2 oz. |
| Olive oil, | .. .. | 2 ,, |
| Spirits of Camphor, | .. .. | 2 ,, |
| Spirits of Turpentine, | .. .. | 3 ,, |
| Hard soap, .. ..<br>Cayenne pepper, .. | each | 6 ,, |
| Cajuput or Lemon oil, | .. | 3 ,, |

Remarks on the use of emetics in general.

sometimes eminently useful in rousing the circulation and bringing about re-action; I cannot speak from much experience of this kind of practice: I have sometimes resorted to it, when opium and stimulants have failed to improve the patient's condition. Powdered mustard or sulphate of zinc act freely and quickly: I think that I have seen them useful, and chiefly I believe by the circumstance that after their effect is over the other medicines just mentioned appear to exert more power. The treatment by tartar emetic was once highly extolled, but has I believe now fallen into disrepute. The difficulty of explaining in what manner its action could have been beneficial would not have condemned it, if it had stood the test of experience. Those who know most of the practice of medicine will, I believe, agree in thinking, that if we can persuade ourselves of the real utility of a medicine, we ought not to discard it because we cannot explain its manner of acting.

And tartar emetic in particular.

Remarks on the exhibition of food and drinks.

The exhibition of drink and food is a matter of consequence in this condition of cholera. Thirst of an intense and urgent character is a constant symptom, usually accompanied by the distinctive burning sensation at the pit of the stomach. In the early years of any practice it was a maxim not to yield to this yearning desire for drinks, as it was thought to increase the vomiting, and to interfere with the operation of the medicines given to check the disease: at the present time many practitioners give drink ad libitum, and some even recommend it as a means of cure. In practice I think it will be found we should be guided on this point by the circumstances and condition of the individual case. The thirst is scarcely, if at all, appeased by drinks for any length of time: but if we find our medicines after a full trial not acting favorably, though they have been kept down, we may allow drink, and sometimes I believe we may do so with benefit; but during the first few doses, we give our remedies the best chance by forbidding all drink whatsoever. It is often the case that while this intense thirst prevails the vomiting and purging, or the latter only, have ceased. Then we may try by various means to appease it, combining stimulants if need be; and if the stomach be still irritable, water acidulated with nitric acid, soda water with a little brandy, effervescent draughts, or champagne and water all the colder the better may be given.

When the stomach will bear it, perhaps there is nothing that allays this dreadful thirst so much as magnesia in a little castor oil, or in milk. Here too the mustard poultice is very useful, and if the general symptoms admit of it a few leeches to the epigastriam will be advisable. Food is useless while the vomiting and purging continue, but when they have ceased it will always be well to give a little sago or arrowroot occasionally with a little wine, till re-action is fairly established. We ground the advice upon experience; and, independent of the hope of absorption, it may be that the application of their usual stimulus to the organs proves useful.

## TREATMENT OF THE ASTHENIC CONDITION.

Treatment of asthenic condition.

This branch of the subject may be got over quickly, because cases are rare in which neither vomiting or purging are present; and because when they do occur, the remarks I have already offered on treatment will in many respects apply to them. I am not sure that it has yet been proved, that there ever has been a case of cholera without the exudation of the peculiar fluid into the intestines; but there are many on record where it has not been passed off, and has only been found after death: such are said to be the severest forms of the disease. It is obvious that here our attention must be chiefly directed to rousing the circulation. We have in fact three of the four indications already laid down to increase the strength of the pulse, to relieve the lungs, and to restore the heat of skin. I must refer to the various remedies suggested for the treatment of the anœmic condition.

Question whether there has ever been a case of cholera without some exudation.

Three of the four indications already considered, applicable to this condition of disease.

Head symptoms briefly alluded to.

I may here allude to an occasional condition we meet with, namely cerebral congestion marked by stupor, engorged conjunctiva, &c. If the other symptoms admit of it, local or general bleeding will be advisable; but if not, we must trust to remove them by restoring the balance of the circulation, especially by determining to the skin. There is no condition in cholera so hopeless as when head symptoms* and an imperceptible pulse exist together. There may be no absolute lesion of the intellect, but a dosing stupor and an indifference to the past, to the present, and to the future, which seem to depend on carbonized blood being in the structure of the brain. And I may also notice in this place the theory lately propounded, that there are two kinds of cholera—the sporadic, and the epidemic or blue. All observers must admit that the epidemic invasions of the disease shew the severest cases: but I neither concede that the blue condition is never seen in sporadic cholera, nor that it is present even generally in all epidemics; it seems in fact to be only a more severe condition of disease where the lungs are early and greatly involved. Cholera may prevail extensively as a mild and as a malignant epidemic. At the present time it is rife at this station. There have been a few cases presenting the blue appearance; but in the great majority of cases it is not seen, though death has often taken place where it has not been present. The European Fusiliers lost but nine cases out of the first twenty-seven men attacked, and of the whole I believe there were but two cases of blue cholera. Since writing the above the amount of cases has increased to forty, but there have only been eleven deaths in all.

Questions whether there are two kinds of cholera, as lately suggested.

### TREATMENT OF RE-ACTIVE CONDITION.

Treatment of re-active condition—febrile re-action does not always take place.

We must here be guided by the symptoms, and these will depend on the original violence of the case and the organs that were principally involved. It will often happen, especially in the case of natives, that there are no symptoms of decided

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* It is an interesting question, how far the head symptoms of cholera may depend upon the direct action of a specific poison on the brain, or by mere non-oxygenation of the blood.

Torpor of the organs may exist and require treatment.

Caution required.

Danger from coma.

Treatment when it threatens.

febrile re-action; but there is another condition requiring treatment, namely, a torpid state of the organs of excretion—the liver and kidneys in particular. It requires great judgment in such cases when to begin the use of depletion or purgatives, for the first may depress too much, and the second bring back the cholera symptoms:* the head and the abdomen have to be watched narrowly. I know no approach of dangerous disease more insidious than what ushers in coma † after severe attacks of cholera; in mild cases we shall not often meet with it. If we watch quietly by the side of our patient he will go off into a dose from which it is easy to rouse him, but the symptom will return. We have seen enough to demand our utmost vigilance, or the patient will often be lost. There are often not any symptoms of increased action in the head, but even then we should apply a few leeches, succeeded by a large blister. Calomel combined with colocynth and scammony, or followed up by castor oil, should be given, and repeated till we free the liver and determine from the head. We must endeavour to excite the action of the kidneys with demulcent diluents, combining small doses of salpetre and the spirit æther nitros: fomentations over the loins will often be useful, and we should use the catheter.

Re-active condition.

Usually depends on abdominal derangement.

In the abdominal viscera any serious disturbance of function, and it is here we usually meet with the symptoms requiring after treatment, will be marked by more or less febrile re-action in various shades between the inflammatory and typhoid; and the pathological condition upon which this depends, is inflammation more or less acute of the mucous lining of the stomach and bowels. Unless there be this re-action with concomitant symptoms, it is surprising how long the action of the liver is stayed with impunity; nor does it appear that the absence of bile has any thing to do with the symptoms of gastro enterite. If no urgent symptoms of any kind be present, (and it may be observed that this is often the case after ordinary attacks,) it is a good rule not to give a purgative for twelve hours after all the symptoms of collapse have disappeared;* we should not be too meddling, but leave Nature to her own restoring work.

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* After the patient begins to recover from the stage of collapse, the disease seems to balance between a return of the lowness and the accession of fever with inflammation; the former condition is the most to be dreaded: it may be brought on by cold drastic purges, untimely bleeding, copious draughts of cold water, or imprudent exertion.—*Twining.*

† It seems extremely probable that this kind of coma may be the effect of urea in the blood-vessels of the brain. The subject demands further inquiry.

When there is undue re-action, if it does not soon abate, it will be found to depend upon inflammation, more or less acute, of the lining of the stomach and bowels. The tongue will vary from bright red to the brown fur, indicative of a typhoid tendency; the stomach will be irritable, and the bowels soon become relaxed, discharging secretions of varied appearance from grey mucus to spinach green, and again to watery tinged with blood. The presence of bile may be looked for and considered a good symptom; a tympanitic state of the abdomen is indicative of danger. There will often be tenderness on pressure; and hiccup is a very common symptom, but by no means a mortal one here, as it is in some morbid conditions. The treatment will depend on the violence of the symptoms and the constitution of the patient, consideration being given to the ordeal through which he has already passed. It is seldom that the lancet will be required: regulated leeching, fomenting and blistering, with mild purging by calomel or blue pill and castor oil, and the free use of diluents combined sometimes with diaphoretics.

Usual symptoms.

Treatment.

Small doses of opium will often allay the distressing hiccup and vomiting, a little magnesia given in combination will be found serviceable, and in obstinate cases I have found hydrocyanic acid succeed in relieving these symptoms. If the suppression of urine be co-existent with these abdominal symptoms, the means already advised must not be omitted; the head must be watched solicitously. Mr. Parkes mentions that he has seen the lungs affected with subacute bronchitis as a sequela to cholera: this is a condition which has not met my observation.

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* Perhaps this rule should be departed from in epidemics, where coma is observed to come on after the disease has been removed. I have certainly seen this a marked cause of death in particular epidemics, and it is ever wise to watch the head closely.

After severe attacks of cholera there is often for a long time impaired function and deranged secretion of the abdominal viscera. The diet must be strictly regulated, and tonics and mild aperients exhibited according to the varying circumstances of individual cases.

## SECTION III.

### DYSENTERY.

Author's sources of experience in dysentery.

My chief practice in Indian dysentery has been among the prisoners in jails, but I have had considerable experience of it in lay Europeans; and I have witnessed the treatment and dissection of many cases among European soldiers.* If we define the disease to be an inflammation of the mucous lining of the large intestines, a consideration of the symptoms and of the successful treatment in the different classes mentioned will impress us with a conviction how indefinite a term inflammation is: how, as marked by symptoms and the effect of remedies, we may have all phases of dysentery, from an intensely acute state of disease requiring the most active depletion, down to a chronic condition where stimulants and astringents are the necessary remedies. Perhaps there is no disease in which the causes act so much according to the habits and state of health of the recipient individual. Expose a prisoner

The disease consists in inflammation of the mucous membrane.

But the symptoms and the treatment shew, how indefinite the term inflammation is.

The causes of dysentery act according to the habits of the recipient.

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* Taking fifty-seven out of every thousand as the whole rate of mortality per annum in Bengal, eighteen deaths out of each fifty-seven are from dysentery.

Illustrated by the varied character of the disease in prisoners, in Europeans in the higher ranks of society, and in European soldiers.

to wet, fatigue and sudden changes of temperature, he will never get the violent acute dysentery, or the deadly hæmorrhagic form of it we see in the European soldier. Subject an European in the higher ranks of life to the same influences, the disease may be acute in him, but it will be found far more amenable to treatment, less tendency to gangrene, or ulceration. I believe for three chief reasons; better diet, better accommodation, and less exposure—there is a higher tone of general health in all the organism.

The real nature of dysentery is best seen in healthy natives and lay Europeans.

Symptoms diagnostic of dysentery.

State of the mucous membrane.

We may perhaps say, that the pure and natural disease is best seen in a healthy lay European or native. In a prisoner, there is a cachectic, scorbutic, or splenic condition superadded; in an European soldier, an over-stimulation from excessive heat and exposure, and at times the local and constitutional effect of the use of spirits in addition. However produced, and in whatever individual present, a case is dysentery when there are discharges of bloody mucus from the bowels. Whether inflammation is present in every such instance, appears a matter more of ingenious speculation than of practical interest; this being certain, that depletion is neither necessary nor effectual for the removal of the symptoms in all cases. Much has been written as to the mucous membranes being but continuations of the integument, and as to their identity of structure and of diseased action with that, and with one another. The latest writer who has proposed a new method of treating dysentery, has favored us with not a very delicate illustration of the identical irritability or liability to impression of the conjunctiva of the eye and the mucous lining of the intestines. I must be permitted to ask, whether the mucous covering of the eye, or of the bronchial tubes, or of the urethra, have ever shewn symptoms of dysentery. That particular state indeed, as marked by its specific discharges and by post mortem appearances, hardly ever extends even into the small intestines in cases of pure dysentery. The peculiar discharge then constituting the disease called dysentery. The superadded symp-

Question of the identity of the lining of the intestines with other mucous membranes in health and disease.

Causes of dysentery.

Sympathy between the skin and the mucous lining of the large intestines.

toms are those upon which we may make such an arrangement of the cases, as will simplify the rules of treatment; but we may first notice briefly the causes upon which the disease depends. In colder climates the disease is occasioned by privation, impoverished diet, and inordinate vicissitudes of temperature. Here the last named circumstance alone frequently produces it; the skin and the bowels are more intensely excited by heat, and consequently more liable to be affected by atmospheric vicissitude. But it is a very curious circumstance, not yet explained, why the impression only affects the lining of the large intestines. It has often been asserted, that the increased flow of vitiated bile increases the irritability of the mucous coat: it will be obvious that the mucous lining of the small intestines endures its share of the irritation.*

General causes produce dysentery; but there are specific ones, which give it a peculiar character in different classes of the community.

Specific causes among prisoners and soldiers.

General effects of climate and locality.

But though high temperature, damp and sudden alternations of temperature cause dysentery, as we frequently see here in the rains among all classes of the community; it is when other causes co-operate that we see it in its worst forms. Mental depression, forced labor, crowded ill-ventilated accommodation, and the little variation and vegetable nature of their diet, render prisoners liable to a peculiar and deadly form of it. Private soldiers again suffer from another series of causes, producing quite an opposite character of disease. The crowded ill-ventilated accommodation they have, in part; but careless exposure, chills after being heated, crude and over-stimulating diet, and the use of spirits in inordinate quantity and of bad quality, are chiefly the sources which among them produce the disease in a highly inflammatory type. It is certain too, that unusually bad conditions of locality or climate may give a peculiar malignity to the disease. It is then that we find it shews a prevailing disposition to run into gangrene and ulceration.* We may even suspect that local sources of impurity in general, and malaria in particular, have more to do with dysentery than it is the present fashion to suppose, if we reflect on the circumstance of its almost disappearance from localities in Europe, where it was once rife and deadly. Dr. Watson, in his valuable lectures, states, on the authority of Dr. Heberden, that from 1667 to 1692 the average number of yearly deaths in London from dysentery was two thousand. During the last century, he adds, the number gradually dwindled down to twenty. A little further on he has the following remark; "The remarkable decline of dysentery in this metropolis has been contemporary with that of other severe disorders, and is due to the same combination of causes. I believe that we may trace these great blessings to an event which was regarded at the time as a national judgment; I mean the great fire that in 1666 consumed every thing from Temple Bar to the Tower. The streets and houses thus destroyed had been filthy in the extreme, close, densely crowded, and consequently most unhealthy." Admitting that the high temperature and moisture in this climate, and the sudden alternations from intense heat to comparative cold, make dysentery a prevalent disease; we cannot forget at the same time that it is seen most, and in its worst and epidemic forms, in jails; in the worst ventilated and most crowded barracks; and in the heart of densely peopled, filthy and ill-ventilated native cities.

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* There are facts which seem to warrant the inference, that the small intestines endure irritation applied to their mucous membrane better than the large bowel. The use of unripe fruits, and water impregnated with salts, I hold to be undoubted occasional sources of dysentery, though Dr. W. Fergusson denies this possibility.—See page 105 of his notes.

Effect of malaria in causing dysentery.

Allusion to the past prevalence and present rarity of dysentery in London.

Quotations from Dr. Watson.

Remarks on the sources and localities of bad epidemics of dysentery in this climate.

I have to regret that I am unable to offer any very interesting or new information on the statistics of dysentery; but

Remarks on the statistics of dysentery.

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* Sir James Annesley, in his great work, treats at great length of constipation as a cause of dysentery, believing that it checks and vitiates the secretions, and thus irritates the mucous membrane. Constipation is a very uncommon thing among the natives or in lay Europeans. The common soldier is, I believe, more subject to it, though not so much so as in his own country. It may be that though confined bowels do not cause the disease, they may enhance its severity.

Author's knowledge of its fatality in jails.

my experience as a Civil Surgeon enables me to affirm, that it is a very prevalent and fatal disease in jail hospitals. In 1842 there were eighty-one deaths in the Tirhoot jail out of a strength of six hundred and ninety-six, or 11.63 per cent., by this disease alone. This of course is an unusual rate, and depended upon peculiar causes elsewhere alluded to. But in Mr. Hutchinson's work on jails, Table 12, it appears that in the Bengal Presidency, out of an average strength of twenty-four thousand, three hundred and thirty-three in 1843, there died five hundred and sixty-three prisoners of dysentery, or about $2\frac{1}{3}$ per cent., from this disease alone. We must add four hundred and sixty-seven from diarrhœa, a disease closely allied to dysentery, and especially so in jails. In the North West Provinces, for the same year, out of a strength of twenty-three thousand, seven hundred and thirty-one, we have three hundred and sixteen deaths by dysentery, or 1.33 per cent., besides two hundred and fifty-eight deaths by diarrhœa. In a military return already referred to, from 1826 to 1832 inclusive, I find the average rate per cent. of deaths to strength in the European portion of the Bengal Army to be for that period 1.4 per cent., and the proportion of deaths to treated per cent. is 7.8 : total of deaths in seven years nine hundred and eighty-three ; average annual strength eight thousand and seven hundred ; proportion of deaths to those by other diseases nine hundred and eighty-three to two thousand five hundred and one.*

Returns from Mr. Hutchinson's work.

Statistics of dysentery in European soldiers.

Mortality in the Bengal Army.

Statistics of Army dysentery at Cawnpore for the last seven years.

I have a return of the European troops at this station for seven years, from which I obtain the following results. Total cases among the European troops at Cawnpore in seven years two thousand and forty-five, total deaths one hundred and twenty-six, proportion of deaths to treated 6.16 per cent. To obtain the proportion of deaths to strength, I have omitted all corps and detachments that were not here for full periods of twelve months. Out of an average monthly strength of six hundred and ninety-one for the seven years, from 1840 to 1846, there have been a total of eight hundred and ninety admissions from dysentery, and forty-two deaths; or an average per annum of one hundred and twenty-seven admissions, and six deaths. The following tables will shew the admissions, and deaths, for each month:—

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* The native soldier, in his cantonment, is surprisingly free from dysentery, but on hard service and under privation he suffers much from it. It soon runs into a chronic form, and he dies in a state of anemia.

| Admissions in seven years. | | Deaths in seven years. | |
|---|---|---|---|
| Seven Januarys, | 44 | Seven Januarys, | 2 |
| Seven Februarys, | 33 | Seven Februarys, | 1 |
| Seven Marchs, | 52 | Seven Marchs, | ,, |
| Seven Aprils, | 64 | Seven Aprils, | 2 |
| Seven Mays, | 69 | Seven Mays, | 2 |
| Seven Junes, | 67 | Seven Junes, | 3 |
| Seven Julys, | 90 | Seven Julys, | 5 |
| Seven Augusts, | 159 | Seven Augusts, | 7 |
| Seven Septembers, | 141 | Seven Septembers. | 6 |
| Seven Octobers, | 63 | Seven Octobers, | 7 |
| Seven Novembers, | 44 | Seven Novembers, | 6 |
| Seven Decembers, | 64 | Seven Decembers, | 1 |
| Total | 890 | Total | 42 |

I have on my table a number of works on this disease. Johnson and Martin; Annesley and Twining; Ballingall and Raleigh; and the late pamphlet of Mr. Hare on Indian Dysentery; Mr. Hutchinson on the disease in jails; with a valuable contribution by Professor Goodeve: and on dysentery as prevailing in all climates, I can consult Dr. John Thomson's edition of Cullen, the Study of Medicine by Dr. Mason Good, Dr. Copland's Medical Dictionary, and the excellent work of the late Dr. Abercrombie on the diseases of the alimentary canal. If I were to try to make an arrangement of cases of dysentery from the joint observations of these authors, the task would be difficult and complicated. The colonitis of Ballingall includes the

Remarks on the arrangement adopted by some of the authors quoted.

hœmorrhagic, the acute inflammatory, and the subacute or irritative stages of Raleigh. Professor Goodeve offers five subdivisions of jail dysentery, and Dr. Copland has almost as many varieties of dysentery as there are causes for it. I propose to make the following arrangement. 1st.—Idiopathic Dysentery; which is an inflammation of the internal lining of some part of the large intestines, and is met with in all phases of violence, and is independent of any other organic affection. This may result in resolution in death by gangrene or extensive ulceration, or it may run into the chronic form. 2nd.—Under the term Chronic Dysentery, I intend to include such cases as are the effect of an original attack of inflammation of the mucous lining, more or less extensive; and where, according to my belief, the symptoms indicate that ulceration exists to a certain extent, at any rate morbid thickening and irritability of the large intestines. I know that some writers believe that where there is ulceration death must follow.* I do not agree in this opinion; and if it is true, there is no symptom before death which can be called diagnostic of ulceration. The third division I propose to call Constitutional Dysentery; where the diseased action of the large intestine is not a distinct and separate disease, but is attendant upon other morbid conditions, such as liver, abscess, disease of the spleen, diarrhœa, or general cachexy. I hope that following this arrangement I shall be able to offer, in a small compass, good practical rules for treating this disease, according to a rational observation of its symptoms and causes.

Arrangement of cases by the author under the three heads of Idiopathic.

Chronic.

And Constitutional Dysentery.

IDIOPATHIC DYSENTERY.

Idiopathic Dysentery.

Varies in the extent of the membrane affected and in

The idiopathic inflammation of the mucous lining of the large intestine, will be met with even in this climate in all shades of extent and intensity. With reference to extent, limited to a small portion of some part of the gut, or spreading over almost the whole surface: with reference to intensity, running a furious course of a few days' duration and ending in gangrene, or enduring for weeks and yet finally terminating in the gradual restoration of the intestines to a normal condition. Such being the varied character of the disease, it will be obvious that very different methods of treatment are applicable. It would be as absurd to treat a common mild incipient case in civil life with heroic bleedings, leechings and purgings; as to meet the intense condition of the disease, as we see it in a private soldier after drinking and exposure, by the mild and simple means, which I know by experience to be often successful. In the first instance we might not produce so great an amount of mischief, but we are surely as far from a scientific course of treatment.

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* In Dr. Abercrombie's excellent little work on diseases of the alimentary canal, several cases will be found where cicatrized ulcers were seen in the intestines.

the intensity of the action going on.

So that the treatment must vary too.

If it is true that in dysentery we can congratulate ourselves upon having the extent and character of the discharges to guide us in judging of the extent and nature of the local disease, perhaps we must agree, to a certain extent, with some authorities who have pointed out that the constitutional symptoms are deceptive. Certainly the amount of constitutional disturbance, or febrile excitement, is not always indicative of the extent of progressing mischief; but if we watch the state of the skin, of the minuter conditions of the pulse, of the muscular power obedient to volition, and of the sensorium, and the aspect of the countenance, we shall often receive useful indications. The state of the tongue is not always a safe guide to the condition of a patient in idiopathic dysentery; but though its moist clean state may be co-existent with serious diseased action, it is equally true that unnatural redness and the dark brown coating are both indicative of danger. In alluding to the nature of the discharges in dysentery, we may first notice the curious illustration of the contradictory nature of medical evidence which is afforded by the recorded opinion of writers on Indian dysentery on this particular point; some contending that retained fœculent matter is a prominent symptom and a chief source of mischievous irritation,* while others give hundreds of cases

Amount and character of the discharges are a guide to the state of disease.

General symptoms are often deceptive.

But should still be carefully observed, as in some cases they give us useful information.

Nature of the discharges.

Allusion to the discrepancy of opinion regarding scibalæ and other fœcal collections.

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* The irritability of stomach is a symptom which seems to

Author's opinion that the truth lies between the extremes of the argument.

Remarks on the subject.

to shew that scibalæ are never found after death, nor considerable fœcal collections of any kind. Such latter is certainly the result of my own observation, but the truth probably as usual lies between the extremes of the argument; and though there is assuredly not much fœcal collection, a small amount of it may prove injurious. We must bear in mind that there is always an action from above downwards: secretions propelled, which if they do not get an outlet, are likely to irritate the diseased surfaces. The subject is curious, and seems to require further inquiry.* In some cases of the disease the action of purgatives is highly soothing, and absolutely diminishes the frequency of the evacuations. Does this depend on their removing fœcal collections, or on their bringing down free discharges which lubricate the diseased surface? Considering the liquid character of these discharges, and even of those which after the first day or two of the disease come away naturally—and indeed there are none other present in the great majority of cases—it is difficult to imagine why their passage should be more difficult than that of the various diseased secretions from the mucous surface.

According to my belief solid fœcal collections are rare to most residents in this climate in their usual state of health.† Hence the reason why scibalæ are rare in dysentery: and the activity of the purging in the early stage of the disease usually empties the large intestines, so that we have only to look to the removal of newly formed fœculent matter and the vitiated secretions poured out so largely by the diseased surface. Again

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depend more upon peculiarity of constitution than to indicate particular conditions of this disease. Perhaps it is most frequent when the cœcum is the part chiefly affected. It is always a disagreeable symptom, and in severe cases a serious one.

[*] See Raleigh, page 6, and Mr. Hare's late pamphlet.

[†] This opinion will excite surprise in those who bear in mind the elaborate pages of Sir James Annesley, and especially his chapter on fœcal accumulations in the large intestines. I record the result of my own observation, and I may instance the great rarity of constipation in the natives of the country.

if we consider the diet which is usually given in the disease, and the drain from the large intestines which must go to lessen the quantity of blood going to the liver, we ought not to expect much fæcal collection.

Diseased secretions from the mucous membrane.

It is a very important inquiry, what morbid conditions of the mucous membrane are indicated by the peculiar character of the discharges? Its difficulty must be acknowledged while we attempt to handle it; and the reader has always to bear in mind that the inferences can at times only be comparative, since we may have different parts of the tube in different conditions, and thus the discharges may be of a mixed character. The clear gelatinous mucus first appears, and would seem but an increased secretion from the mucous follicles or solitary glands. As it becomes tinged with blood we may conjecture that the general vascularity of the mucous membrane has increased to cause exudation; or, as some writers describe, the solitary glands have inflamed and enlarged with surrounding rings of increased vascularity.* As the discharges become more watery they are significant of more extensive inflammatory action with an engorged congested state of the vessels. The raw meat washings-like fluid is indicative of serious disease, intense congestion of the mucous membrane and the underlying cellular structure with I believe abrasion of the epithelium, as we often see shreds of membrane mixed in these discharges. The flow of pure florid blood may, I think, depend on the rupture of a particular vessel of some calibre, or upon exudation from a highly congested mucous membrane. When the blood is dark, grumous and fœtid, varied stages of sphacelus and ulceration are existent. Extensive sloughing surfaces produce most cases of the hæmorrhagic dysentery of Raleigh. Grumous fœtid blood mingled

Condition of disease which they indicate.

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* When flakes of pure coagulable lymph are formed, it would seem to be in something like this condition of the membrane, and where a continuous surface must be affected. Mr. Raleigh states very confidently, that Mr. Twining had mistaken a cylinder of this coagulable lymph for an entire piece of intestine which had intus-suscepted and sloughed away—a mistake we can scarcely imagine possible.

with pus and shreds of separated membrane may lead us to suspect that a sloughing kind of deep ulceration is persistent; the more pus and the less grumous sanies perhaps the more defined and circular the ulceration. When there is a discharge of white mucus like soft half-coagulated albumen, it is a sign of a relaxed state of the vessels after inflammation, but without solution of continuity.

We may not only have every degree of commingling of these diseased secretions, but they may contain fœculent matter in varied color and consistency. The vitiated secretions from the diseased mucous surface* being discharged separately from the fœces, is considered a proof that the small intestines are not affected; but in aggravated cases of the disease the usual processes of chylification and fœcation are hardly going on, and the secretions of the liver and of the upper portion of the alimentary canal are passed off in shades varying from pitchy black to green or yellow. They may be mixed with blood and mucus, or as already mentioned passed untinged. As we find all this in the absence of any symptom of organic affection of the liver, we must be content with stating it here as a fact that the secretions of the liver are irregular and varied in character, without our being able to say upon what condition of the liver or other cause such irregularity or variety is dependent. It is a circumstance which has often excited my surprise and interest, that even in the acme of a severe case several purely fœculent bilious motions will be voided in succession, leading often to a fallacious hope that the disease has been arrested; but soon to be followed by repeated dejections of vitiated discharges in which again there will not be a trace of fœculent matter. I believe it is correct to add that the first mentioned condition may present itself when the mucous membrane of the small intestines is diseased, but not the second, the diseased secretions will then always be mixed with fœculent matter.* The observation is practical, if not universally true.

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* "When portions of the mucous surface are actually detached they are generally of considerable extent, and present a sloughing appearance quite different from the albuminous exudations which are more frequently seen in the dysenteric evacuations, and which are commonly remarked at an earlier period of the disease."—*Annesley.*

We read much of the tormina and irritation caused by the passage of vitiated secretions over the diseased inflamed surface. I am sure it is sometimes true that the secretions from above have a soothing effect in their passage. Every practitioner must be able to bring to mind cases of dysentery wherein purgatives had not only the effect of increasing the quantity but also of diminishing the frequency of the stools. Admitting that it is not always so, and that in no disease do the effects of medicines vary so much, I believe we must admit also that when purgatives do act beneficially it is by bringing down bile or fœculent matter.

Symptoms which, besides the nature of the discharges, indicate the severity of a case.

In addition to the nature, amount and frequency of the discharges, we judge of the severity of a case of idiopathic dysentery by three other chief symptoms, the pain on pressure, the tormina, and the tenesmus. It is only when the serous covering of the bowels has become inflamed that pain is very acute or is complained of till pressure is used, but in the early stages of acute cases pain will seldom be absent when the hand is applied so as to act upon the deeper seated organs. Over the cœcum, the transverse arch, and the segmoid flexure, are the parts we should especially explore, bearing in mind that we have to look for tenderness more than actual acute pain, and that even the tenderness varies in degrees by which we have to judge of the amount of inflammatory action and the necessary treatment; nor must we forget that after inflammation has passed on to gangrene, the sensibility of the parts so affected becomes much deadened.

Pain on pressure.

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* "But in regard to all the forms of the disease, it is to be kept in mind that the peculiar discharges from the diseased surfaces are only to be distinctly recognised when the disease is in the colon. When it is in the small intestines, the appearances are distinguished or modified by the admixture of these discharges with thin fœculent matter, or with articles of nourishment partially changed."—*Abercrombie.*

Tormina.

The tormina or spasmodic griping, it appears, may either depend upon the passage through the large intestines of secretions from above, or upon the irritation excited by the diseased secretions of the large intestines themselves. I think the latter the more frequent cause, especially when the disease lies high up in the gut; at any rate the amount of tormina is to be considered as indicative of the highly increased sensibility of the mucous lining of the colon.

Tenesmus.

Tenesmus or straining with a constantly returning inclination to evacuate the bowels is seldom absent altogether, but intense degrees of it indicate that the rectum is involved, and if there be little tormina and a limited amount of discharge that it is chiefly so. The extent to which tormina or tenesmus is the most prominent symptom, will lead us to judge what part of the bowel is most affected in cases where the absence of tenderness on pressure might otherwise render the discovery difficult. Retention of urine, or even difficulty in voiding it, are indicative of the rectum being involved. This is a symptom which mostly attends violent cases of the disease.

### PATHOLOGY OF DYSENTERY.

Morbid changes chiefly in the large intestines.

In the idiopathic dysentery now under consideration, we have of course to look for all the morbid appearances in the intestinal canal; and we shall find them chiefly confined to the mucous membrane, and almost universally to that part of it which forms the internal covering of the large intestine. Of the state of the parts which exists in mild cases which are not fatal, we can only have knowledge when a patient dies of some other complaint while labouring under mild dysentery. It is curious how little this point has been investigated. Its further pursuit might disclose whether dysentery be, as some have hinted at, a specific eruptive disease, or whether it is owing to the peculiar anatomical structure of this mucous membrane that in an early period of its inflamed state it begins to pour out bloody mucus, a particular in which it differs from other mucous membranes.

Supposed state of the membrane in mild cases.

Opinion of Dr. J. Murray and Mr. Parkes.

Regarding the first supposition, the reader will find a paper by Dr. John Murray, in the Transactions of the Calcutta Medical and Physical Society for 1834. Cholera having broken out in a detachment where d ysentery was prevalent, an opportunity was afforded of examining the state of the large intestine; and Dr. Murray inferred from the result of his observations that dysentery was sometimes at least an eruptive disease. This view of the subject has not maintained itself; but Mr. Parkes, and I believe some other writers, have lately suggested that the essentiality of dysentery consists in inflammation, tumefaction, and ulceration of the solitary glands or mucous follicles. Such are supposed to be the pathological conditions existent in different stages of milder cases, a higher degree of severity depending up on the extension of the inflammation to the deeper textures. It appears certainly the case that the solitary glands, or mucous follicles, have a great aptitude to swell, inflame, and ulcerate in the large intestine; but it seems at the same time true that the inflammation in dysentery is at times continuously spread over the whole mucous membrane, as in cases for instance where a cylinder of lymph is effused. We may enumerate the following morbid conditions in dysentery.

1st. A blushed or reddened condition of the mucous surface. It requires the visus eruditus to distinguish this condition from red patches of vascular engorgement that may occur after death.

2nd. An exudation of lymph from such inflamed surface, either in patches, or shreds, or sometimes in a tubular form, corresponding to the diseased surface of the canal. Strictly this is not lymph, for it never becomes organized; a beautiful provision of nature to prevent the closure of the hollow tubes lined by mucous membrane.

Different morbid conditions.

3rd. Along with or without a continuous blush over the mucous coat defined elevations, styled by some granulations, by others pustules, by others vesicles. These would seem to be the solitary glands in a state of tumefaction, and they will vary in appearance somewhat according to the stage of disease.

Description of morbid conditions continued.

4th. The state of defined ulceration varying in minute particulars like ulceration elsewhere; but when it is a state of pure ulceration the ulcers are circular and separate, almost proving that this condition of disease is in the mucous follicles. These ulcers have often hard defined edges. They may be large and separate, or lie closely clustered and small, giving what is called the honey-comb appearance. In both these cases the intervening mucous membrane may be healthy, or it may be inflamed and softened and thickened. The ulcers may not be deeper than the mucous membrane, or they may have ate through the subjacent cellular or vascular tissue, having the muscular tissue as their basement; at times even that texture has been destroyed.

Ditto.

5th. A mixed condition of ulceration with sloughing. This is the most common appearance in fatal Indian dysentery. The ulcers are usually large and irregular and deep, with portions of the mucous membrane detached or easily separated from the subjacent coats, which are here usually thickened and softened; the calibre of the tube may be smaller or larger than natural. I have already remarked that we may have the ulceration varying as it does elsewhere[*] In some cases, particularly those of long standing, there will be a fungous granulating condition of the diseased parts.[†] For a description of the varied ulcerated appearances, I may refer to the work of Dr. Abercrombie on the Diseases of the Stomach and Intestinal Canal.

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[*] Dr. Abercrombie has stated what I have not observed mentioned by other writers, that it is a common appearance in early stages of dysentery to have a greater or less extent of the mucous membrane covered with irregular patches of a bright red colour, and sensibly elevated above the level of the surrounding parts. They may be covered with a brownish tenacious mucus by flakes of false membrane, or may be studded with vesicles passing sometimes into a state of ulceration.

[†] I once saw a fatal case where portions of the mucous coat were of a continuous fungous appearance—not points of granulation, but like the whole surface of a large sore that has granulated higher than the skin. It was fatal in a few days, with much hæmorrhage. There were no ulcers.

Description of morbid appearances.

6th. The inflammation may produce a continuous slough of the mucous membrane, without ulceration, and this condition may extend to one or all of the other coats. I have myself seen a case where even the peritoneum had lost its shining healthy appearance, while the other coats had become completely sphacelated. The sigmoid flexure was the seat of disease.*

7th. The whole calibre of the tube for a certain distance may be thickened (and is sometimes contracted, at other times enlarged into pouches) by interstitial deposition. It is an interesting question whether this general thickening can be present, independent of ulceration; I believe it can, and that it is a cause of the irregularity of bowels which is so common after dysentery that has left no ulceration.

8th. The peritoneum may become involved without any fissure in the intestinal tube—lymph may be effused, and this leads to unnatural adhesions.

9th. When the ulceration destroys all the coats, some of the contents of the bowels pass into the peritoneal cavity, producing there intense inflammation, and, as far as I know, inevitable death. This is not a common termination.

10th. In prolonged cases the mesenteric glands are found enlarged, and a blush of redness may run some way up the ileum. I have never seen ulceration above the valve, but it has been met with occasionally in dysentery.

### MANNER IN WHICH DEATH ARISES IN DYSENTERY.

Death by anœmia.

Before proceeding to the treatment of idiopathic dysentery, we may briefly consider the various modes in which it produces death—1st, the hæmorrhage is in some rare cases so profuse as to cause death by the absence of the stimulus of blood to the heart's contraction. This is a rare but an occasional cause of death in dysentery; although pathologists have explained death by hæmorrhage to begin at the heart, it must be obvious that this is only one if it be the first link in the chain; the absence of blood must at the same time cause the functions of the brain and of the lungs to cease.

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* It is supposed by some that this kind of morbid appearance is the effect of inflammation, beginning deeper than the mucous coat, and having a resemblance to the phagedenic inflammation of the common sub-cutaneous cellular substance.

Death by asthenia from high inflammatory action, or by coma.

2nd. Dissection shews that the mere force of inflammatory action may cause death, though this is rare, in dysentery; and (as in all cases where there are no organic changes to destroy the functions of organs) death is difficult to account for; but it takes place at the heart, by its action gradually ceasing, or in the brain, by a gradual destruction of its complicated functions. Though we always have morbid appearances in the bowels in cases of death from dysentery, it does not follow that to these changes alone is death to be attributed.

Gangrene, or deep ulceration, may also cause death by asthenia, or by coma.

3rd. Where gangrene, or sphacelated ulceration, has taken place, (and this is the common cause of death in acute cases) the deep impression on the nervous function causes death at the heart or in the head, the former most common. We know not how to explain why in one case the circulation should first be overpowered, while the attributes of the brain are untouched, and why in another it happens that thought, consciousness and volition first pass away, while the action of the heart only ceases when the lungs no longer take their parts in the wonderful series of the vital actions. They are affected through the brain.

Death from gangrene and hæmorrhage combined.

4th. The combined effect of hæmorrhage and gangrene often causes death, beginning here too either in the head or at the heart.*

Death from ulceration,

5th. There is death by ulceration, before the disease can be said to pass into the chronic stage. It arises here it would seem by the combined effect of nervous depression and inanition—all the organs cease to be properly nourished, as marked by the emaciation: slowly and imperceptibly the force of the circulation becomes weakened, but here too the head may become affected in the ending struggle. The taper of life burns dimly, and its light is extinguished by degrees: it may go out for want of air—death at the lungs or apnœa; the oil may be finished—death by anæmia; the wick may be clogged—death by coma.

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* This is Raleigh's hæmorrhagic dysentery.

### TREATMENT OF DYSENTERY.

Summary of indications of treatment.

The observations we have offered on the various ways in which dysentery produces death, enables us to suggest a brief summary of the indications of treatment. Discharges too profuse must be moderated; high inflammatory action must be subdued, as, independent of the likelihood of the occurrence of gangrene, or ulceration, from its continuance, it may, as stated elsewhere, cause death independent of these, by the constitutional effects it produces.—*See Alison's principles of Pathology, page* 203. The shock of gangrene, or sphacelating ulceration, upon the nervous system must be watched and obviated as far as possible. The danger from pure inanition must not be overlooked, nor the circumstance that it will likely arise, if the disease be allowed to pass into ulceration.

### BLOOD-LETTING.

Many cases curable without blood-letting, incipient cases especially.

That many cases of dysentery may be successfully treated and easily cured without loss of blood, I know from long experience. There are few cases indeed so severe that, if consulted early, I would not first try to put a stop to, as I have often done, by calomel and opium, followed by a purgative, or by combining the opium in the shape of laudanum with castor oil.* If the secretions are very vitiated, and yet the fœculent discharges profuse, I give calomel and opium, following them up by a purgative; if there be scanty or an absence of fœculent discharges, I give the oil and laudanum combined; but I have no desire to depreciate the value of blood-letting: we should never be long of resorting to it when the symptoms are at all violent. In cases where there is much discharge of florid blood that we can judge to exude from a congested mucous membrane, it will be especially useful; and always when this symptom or other severe characteristics of the disease are attended by a stenic type of fever, general bleeding will be found very useful. If it be true, however, as it is, that some of the worst cases of dysentery are unaccompanied by marked febrile symptoms. I believe it is here too that general bleeding does less good, and may sometimes be dangerous.

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* This kind of treatment can only be depended upon within the first few hours. I pretend not to explain how the cure is effected. When I was a very young boy at school, I was completely cured of a bad attack of dysentery by a tumbler of hot whiskey punch. There would seem to be a period early in some inflammations, as well as after their long continuance, where stimulating

Practical suggestions regarding blood-letting.

The cold clammy sweats should teach us caution in using the lancet; the fiery red tongue should make us expect it will not be borne well; and the brown furred tongue or sunk countenance should forbid it. I believe it is true also of epidemic dysentery that it has often an asthenic character in which there is a great tendency to collapse, and to the termination in sphacelus: here I think it is also true that bleeding is less likely to produce a resolution of the disease, so that it only tends to weaken the vital powers. The character of the discharges considered with reference to the use of the lancet, and allowing for the fact that the progress of the disease may be at different stages in different parts of the bowels, the more florid the blood in the discharges the more freely may we use general bleeding. When it becomes dark and grumous, we must be careful, especially when the quantity of such discharge is large. The watery discharges tinged with florid blood, having the appearance of water in which raw meat had been washed, as they indicate intense inflammation and congestion, demand bleeding whenever the other symptoms warrant its use.

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the vessels is useful, although we have to consider dysentery complicated with other visceral disease; hereafter I may mention how much the amount or even the propriety of general bleeding should depend upon individual constitution.

### LEECHING.

In the great generality of cases leeching is the best manner of drawing blood in dysentery, especially if the disease be of any standing; day after day they may be applied while pain continues on pressure, or as it returns.* Observation and experience teach us that if we drew blood from the arm, till we had almost drained the system, it would not relieve the dull pain on pressure caused by the congested and inflamed state of the mucous membrane; but the regulated use of leeching will remove it in a majority of cases. Giving consideration to the acknowledged doctrine that inflammation of mucous membranes is little amenable to general blood-letting, perhaps because it so seldom terminates in resolution, it has often suggested itself to me whether general bleeding can ever be necessary in dysentery, except where there are high febrile symptoms, or the peritoneum is obviously affected. In strong robust subjects it may help the effect of leeching, by reducing the force of the circulation; and in very urgent cases we gain a great deal in point of time, as long as there is wincing on pressure, and the condition of our patient admits of it; leeching must be continued over the part affected. Their application to the end of the rectum I have not found more useful, except in cases where that bowel is more prominently affected.

Suitable and advisable in almost all cases of dysentery.

### PURGATIVES.

I have already made some remarks on the action of purgatives in dysentery. I consider their exhibition a very nice point in the treatment, and that a great deal depends upon our

Their use requiring close observation.

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* There is a doctrine which I first met with laid down by Dr. Watson that, according to the rapidity with which disease progresses, so should remedies be applied, to be most useful. In his own words "the treatment must as it were keep pace with the disease." Upon this principle most cases of dysentery will not require very active treatment with reference to time; according to Raleigh, we have five or six days of the disease in its worst form, and commonly from ten to twenty-five.

judicious observation of their effect in individual cases. I can have no doubt that too much dependence is placed upon them as a general rule, and that great mischief is done by keeping up a constant purgative irritation. Speaking theoretically, we would only expect benefit from purgatives in two ways—1st, by their removing fœcal collections; 2ndly, that by bringing down discharges from above they may soothe by lubricating the inflamed surface. Then, supposing that there are not fœcal collections, and that the passage downwards of bile and other secretions, added to the increased peristaltic movement produced by purgatives, must tend to irritate an already inflamed surface, what benefit are we to expect from purgatives?

Remarks upon their use.

If these observations shall prevent the indiscriminate and heroic use of purgatives, and lead to a careful observation of their effect in individual cases, the object with which they are offered will be gained. Fœculent evacuation must be obtained: we shall find that in many cases it occurs pretty freely without purgatives, and where it does not we shold never forget that it is an object to secure it by the mildest means possible. Castor oil, rhubarb and magnesia, and the compound powder of jalup, which I have not found so drastic as Mr. Raleigh considers it, are those which will be found to answer best. Where there is severe tenesmus on the passage of scanty stools, I have seen great relief by giving senna and salts, by which free and watery stools are produced.* We must take care that the dose is not so large as to go on acting after the fœculent matter has been discharged, and check that action if necessary. Most authors advise the daily use of purgatives, but Mr. Raleigh lays it down as a principle of treatment to give a purgative every second day. The fulness of the abdomen, the character and the frequency of the stools, the effect produced by the last purgative, and all the particulars of the individual case, should guide us more than any specific rule. Purgatives may be compared to the washing of sores on the surface of the body, removing filthy accumulations but producing pain and irritation unless applied with gentleness.*

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* " It is scarcely necessary here to repeat that scibalæ and solid fœcal matter are never found in the intestines of persons laboring under acute dysentery of this country." This is an extract from Mr. Raleigh's work, the result of hundreds of dissections. Few men had a better opportunity of studying dysentery, and fewer still havemade so good a use of it.

### MERCURY.

The use of mercury in dysentery is in the opinion of the author too indiscriminate.

Reflecting upon my own practice, and what I have witnessed in the practice of others, and upon what we know of the action of mercury, I cannot but say, in recording my opinion of its use in dysentery, that it is prescribed too largely and too indiscriminately. If we use it as a purgative, we must recollect, independent of the general considerations regarding purgatives, that the purgative action of calomel, and even of blue pill, varies greatly in different individuals. Dr. Christison says, at page 427 of his work on poisons, "when given alone, a few grains of calomel will in some constitutions induce a violent hypercatharsis, and larger but still moderate doses have with most people such a tendency to cause severe griping and diarrhœa, as to have led to the practice of combining it with opium when the object is to salivate." Admitting that the cases in which severe hypercatharsis takes place from small doses are so rare that they hardly merit consideration in a practical point of view, we have surely proof enough in the above extract (and we may add our own knowledge of the action of calomel in other diseases) that, for a mere purgative effect, calomel is not an advisable medicine. If we prescribe mercury to increase and correct the secretions from the liver† and from the mucous lining of the intestines, we are perhaps taking the most rational view of its use. I have

Reasons.

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* Doubtless the effect of different substances on the inflamed membrane may depend upon minute morbid conditions which can only be ascertained by observation. Even in sores on the surface, it is often only by experiment we are able to ascertain what soothes and what irritates.

† I may remind the reader of Dr. James Johnson's graphic description of his own case.

Remarks on its effects.

already alluded to the frequency of disordered secretion from the liver in dysentery, and recorded my own observation that the passage of healthy secretions gives relief. The secretions may be scanty as well as depraved, and we may state it here as a fact that, before acting constitutionally, the local action of mercury seems to be to excite the flow of bile and of the other intestinal secretions. This frequency of deranged biliary secretion in dysentery, without actual disease of the liver, may be owing to our inability to discover the milder phases of liver disorder; but Mr. Martin has called the attention of the profession to the frequent co-existence of morbid action in the cœcum and in the liver. The difficulty seems to be how to explain that if the mercury stimulates the upper part of the mucous lining, it should not also act upon the inflamed surface, and prove hurtful as a local irritant. Perhaps we have the explanation in the very fact of its action on the liver and on the upper part of the membrane.

The third part to consider is the constitutional action of mercury in idiopathic dysentery: 1st, Is there a constitutional effect from it before the occurrence of ptyalism? 2nd, Is the induction of ptyalism a certain cure? 3rd, Is the evidence in favor of ptyalism so strong, that we should try to produce it, even if we find its local action hurtful? 4th. What is the best way of inducing it? We may suppose that mercury may act constitutionally in two ways before it brings on ptyalism—1st, by its local stimulus upon the mucous membrane, and, 2ndly, we need not doubt that it is absorbed into the blood before the salivary glands become manifestly affected.

It is imposible to consider mercury a certain cure for dysentery, since we see patients attacked with the disease, who are at the time in a state of salivation; and since we see the mouth become affected without the subsidence of the dysenteric symptoms.

The third question I must think should be answered in the negative. Although inclined to advocate the moderate and discriminate use of mercury in dysentery, I believe it

Remarks on the use of mercury in dysentery continued.

will often be found to act too violently as a local irritant, and that there are some constitutions where its exhibition will not prove useful, and may prove dangerous. There are some who think that all the beneficial effect of mercury may be looked for short of ptyalism. Dr. Alison holds this view in the following passage.* Touching the last question proposed on the constitutional effect of mercury, namely the best manner of inducing salivation, it seems curious that if the benefit arising from the use of mercury be purely constitutional, and that its administration by the mouth does often occasion violent abdominal irritation, it should not have been found preferable to salivate by rubbing in blue ointment. But such, it would seem, has not been the result of experience. Upon the whole, with regard to the use of mercury in dysentery; it may be observed that we have to watch its effects with diligence in the individual cases; that in small doses, and in combination with ipecacuanha or antimony, repeated two or three times in twenty-four hours, it will often be found to improve the discharges, and to reduce febrile action; that if so prescribed, it acts as an irritant, it will be necessary to combine it with opium or with Dover's powder; and it is then, or when the stomach in particular is very irritable, that the twenty-grain dose is often so manifestly useful; and, lastly, that when we wish to salivate quickly, and give mercury largely by the mouth, it must always be combined with a sufficient amount of opium. In cases where mercury in all shapes is found to disagree when given internally, and we still wish to salivate, let us trust to the diligent use of the blue ointment. Disease of the spleen, long residence in the country, or a generally impaired constitution, should militate against ptyalism; and it seems to admit of a question whether the use of mercury does not in some constitutions

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* "It may, however, certainly be stated in general terms that the cases in which that combination (calomel and opium) has seemed most useful have been most frequently those in which the symptoms having subsided, it was withdrawn without the mouth being touched, and, therefore, without any proof being given of its specific virtue."—*Alison.*

Ditto.

increase the tendency to sloughing and ulceration. Some I doubt not will think my opinions luke-warm and undecided for or against mercury. The more I have studied the subject, and the more I have looked back for the memories of my own experience to guide that study, the more have I felt the difficulty of the question. I believe it is correct here again to say, ibis tutissimus medio. Those who would argue that calomel and other preparations of mercury must be useful in dysentery, because they have been so long in use by the profession, may feel inclined to doubt the strength of the argument by reflecting on the past history of many drugs—the saffron of Bontius, the hemlock of Baron Stork, &c. &c. I have never, that I can now recollect, seen an attempt made to explain why larger doses of mercury may be given here with benefit than in a cold country. It is not so with regard to other remedies; and with respect to the acknowledged action of mercury on the liver, one would imagine that here that organ would require less to rouse its action.

Ditto.

In quoting the following from one of the best practical authorities of modern times, I am only anxious to adduce it as an argument against the system of treating disease by a name, and with a dogmatic faith in the efficacy of one particular drug, for its cure. I am quite certain that I have seen benefit from the use of mercury in dysentery, but I can affirm with equal truth that I have had to desist from its use in many cases, and that I have often had to regret placing too much faith in its powers. The following is the quotation I have alluded to: "In the dysentery of tropical climates," says Dr. Abercrombie, "calomel is given in still larger doses, as from ten to fifteen, or even twenty, grains, repeated three or four times a day, generally combined with opium. Of this mode of treatment, as applied to the dysentery of tropical climates, I would not presume to give an opinion, because I have had no experience; but when I have seen a similar practice attempted in the dysenteric affections of this country, it has appeared to be decidedly injurious."

## OPIUM.

Remarks on opium as a remedy in dysentery.

Opinion of the late Mr Twining on this subject.

Reasons for considering it erroneous.

It seems to me a surprising circumstance that the use of opium in dysentery should ever have been discontinued, but such was the case, and such I believe is the case still, to a considerable extent. The late Mr. Twining condemned it in no measured terms, and such was the weight of his authority as a writer on Indian disease, that even after the impression is gradually wearing off it is prescribed yet by many with a trembling hand.* All this may well excite some astonishment, if we reflect, 1st. that it accords with the true principles of medicine based upon science, as well as upon observation, to prescribe opium in a disease, where so much irritation accompanies the inflammation; besides that, in many other inflammations, and particularly abdominal ones, opium is one of our best auxiliaries to depletion—2nd. that the testimony of centuries upholds the value of opium in the treatment of dysentery—3rd. that the disease is identical in its nature, though not in its intensity, with the dysentery of cold climates, in which the best practitioners look upon the use of opium as one of the essential points of treatment. It need not interfere in any way with depletion, but will often be found to enable us to deplete more. It need not be allowed to do what Mr. Twining said of it, that it masked the deadly symptoms, for we can always obviate its constipating effect by purgatives† Its effect upon the brain, its liability to induce coma, is the critical and difficult point in its exhibition. Is opium more apt to affect the head because the patient is laboring under dysentery? We might be induced to suppose so by the small doses which Mr. Raleigh and others prescribe—doses indeed which must be held almost useless; but it would seem on the other hand that there is a belief to the contrary prevalent in Europe. "In severe dysentery (says Dr. Christison, in his valuable work on poisons,) the susceptibility of the narcotic action of opium is so much impaired, that a person unaccustomed to the use of that drug may continue to take daily, for several days together, a quantity which might prove fatal to him in a state of health. In the severe form which dysentery occasionally puts on in this country, I have known a patient take from twenty-four to thirty grains of opium daily, and retain it all without experiencing more than a mild narcotic action." But, notwithstanding the weight of such authority, the result of my own observation induces me to say that there are cases of dysentery, in this country at any rate, in which the brain becomes affected, and in which consequently the use of opium requires the greatest caution. When the head is clear, the following benefits will accrue from its exhibition: it will at an early period often stop the disease at once: later it will produce a temporary cessation of the purging, from which we need not doubt that benefit arises constitutionally and locally—constitutionally, by the relief from constant suffering and the procurement of sleep; locally, by allaying the constant peristaltic movement which must be a source of irritation. It seems a proof that occasional repose to the bowels is salutary, that opium is more useful than the sedatives which do not stop their action. The constitutional effect of opium has, moreover, often appeared to me in bad cases to counteract the depressing effect of the disease on the circulation. This applies chiefly of course to those violent cases where deep ulceration and sloughing cause death at a comparatively early stage of disease, and is especially true with regard to cases where the profusion of the discharges, bloody or watery, is acting injuriously. It is in such cases that its combination with the acetate

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* *Note to a paper by Professor Goodeve.*—I am happy to see that I do not stand alone in this opinion: Mr. Mackinnon, in an able paper lately presented to the Society, fully agrees with these views, and has indeed anticipated some of them. I consider the profession much indebted to that gentleman for his treatise.—*Bengal Medical Transaction*, vol. viii., part 2nd.

† Nor is absolute constipation a constant effect of its use in dysentery; at times it seems, by removing spasm, to permit frequent evacuation.

Opium in dysentery with reference to head symptoms.

Benefits ensuing from its use when the head is not affected.

of lead is advisable. Where the state of the general symptoms will admit of it, that is to say where the functions of the brain are not impaired, but death is threatened by the extinction of the heart's action,* I believe that opium is the sheet anchor of treatment, preferable to stimulants probably by reason of its combining a sedative with the stimulating quality.

Dose and combination with calomel.

The advantage of combining opium with mercury has been already alluded to: for the procurement of sleep, the soothing of pain, and the temporary check of purging, one large dose (three grains) may be given at night combined with blue pill or calomel, if that be thought desirable. It is as well in ordinary cases, (to which in practice, however, many exceptions will be found where the pain and irritation are not relieved by bleeding or purging.) to let the day pass without opium: we shall be able to observe the state of the discharges, and to see that the narcotic symptoms wear off completely. It is true that the bowels are usually most irritable at night during an attack of dysentery; this fact, of which I have seen no explanation, (it may depend on the diminished action of the lungs) may be used as an argument for or against the night dose of opium. As to the use of opium in gangrene generally, it is a doctrine of the schools that it should be given in small doses, frequently repeated; but with regard to dysentery, when death is threatened from sloughing, my own experience leads me to say that the best result is from as large doses as the head will bear, given at longer intervals, but some effect always kept up. It seems that the strong narcotic impression weakens the power of the disease over the circulation: on the ordinary night dose I can add nothing from my own pen more forcible than the following quotation from Dr. H. H. Goodeve:—"Many patients have passed restless and agonized nights, from the dread of administering opiates entertained by the medical attendant, who has followed

How to give it in cases of sloughing.

Quotation from Professor Goodeve on the night dose of opium in dysentery.

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* "Inflammation of the mucous membrane of the great intestines, producing the symptoms of dysentery, whether going on to ulceration or not, is almost always attended with more or less of the sedative effect on the circulation."—*Alison.*

Mr. Twining's directions on that point too implicitly, when the use of a powerful narcotic would have placed the patient comparatively in heaven." When an ulcer has penetrated through the peritoneal, coat we are taught by the experience of others that the only hope (and that a faint one indeed) of saving life is by giving large doses of opium, as recommended by Dr. Stokes, of Dublin. I am not aware that this practice has ever been tried in India.

Concluding remarks on the use of opium.

In conclusion on the subject of opium in dysentery, I may observe that in cases accompanied by high and stenic action, (such as we meet with in the young, robust and plethoric) its use must be preceded by free depletion; that on the other hand it proves most useful in irritable, nervous, worn-out subjects, but that I know nothing to contra-indicate its modified exhibition except head symptoms.* I would here throw out a hint whether there may not be a distinction, as in the head symptoms of other diseases, between those cases that depend upon congestion and those which are caused by irritability. In other parts of my work I have alluded to the difficulty and the interest of investigating minute head symptoms, with reference to the pathological condition of the brain, upon which they are dependent, and to the best manner of treating them. No subject is more deserving of the attention of the profession, and I would especially point out how little we yet understand why identical organic lesions, remote from the head itself, at one time cause death by overpowering the circulation, while the functions of the brain remain perfect, at another produce the fatal event by pure coma, leaving the heart's action intact to the end, and why in a third set of cases the head symptoms and the failure of the circulation progress together.

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* And with regard to them it is the tendency to stupor and muttering delirium, which should make us refrain from its use, more than the busy restless delirium, accompanied by want of sleep, and an anxious expression of the countenance. I was consulted late in the case of a lady at this station, where opium suggested by me after other treatment had proved useless, had a remarkable effect. She had taken up to that time no opium; the head was affected; for if left quiet while you sat by, the thoughts wandered, and she commenced the manual act of sewing diligently. Here opium certainly restored the functions of the brain, and her husband, himself a medical man, continued its use to the end. She died, for the attack was a fearful one, but with the intellect clear and collected.

### DIAPHORETICS.

Diaphoretics uncertain in their action.

Antimonials.

Dover's powder.

Warm bath.

This class of medicines appear to me to have all, if not more, of the uncertainty here that they have as remedies for the cure of other diseases. They are most, if not all of them, irregular in their effects, and sweating does not with any certainty lead to a relief of symptoms. When fever is high, James' or antimonial powder are the best diaphoretics, even if they do not produce any decided sweating: experience makes out that they cool the skin, and lower febrile action. When the skin is dry, without fever, Dover's powder is the best diaphoretic. The reader will please to recollect that I have spoken of these medicines as diaphoretics. The last named remedy, and the simple powder of ipecacuanha, I consider to be both valuable remedies in dysentery. The opium, on the principles already noticed, and ipecacuanha appears to exert a mild emulging action on the mucous membrane. Its emetic action should be avoided, and may be so by gradually increasing the doses. There is the high authority of Sir James Macgregor in favor of diaphoretics combined with blood-letting; but Dover's powder was that which he advised. The warm bath is useful sometimes in the early stage of acute cases, but after a day or two occasional fomentations are much more soothing and useful. It may be well to protect the belly with a flannel binder, but the complete dress of it recommended by Mr. Raleigh is surely ill-suited to this climate.

### ENEMATA.

Use of enemata an important part of the treatment.

The use of enemata of various kinds is a very important part of the treatment of dysentery, and he will be most successful with them who observes their effects closely, and perseveres in or desists from their use, according as they relieve or aggravate

Remarks on the necessity of watching their effect.

Opiate enemata.

Oleaginous enemata.

Astringent enemata.

Capacity of the colon.

Opinions of Messrs Raleigh and Hare.

the symptoms. Such a remark as this I would not have made if I had not seen so much disregard in practice to the most obvious effects of prescriptions that pre-conceived opinions and reading lead to the exhibition of. There is to me no rule more golden in practice, than to hold the judgment unbiassed so far as to observe the effects of our remedies on the individual cases. Injections of opium or laudanum, from two to four or more grains or from sixty to a hundred drops, in a few ounces of water, have often a very soothing effect, allaying the tenesmus, sometimes the tormina. and at the same time diminishing the frequency of the discharges. It will, however, be found that in some cases even this sedative enema exhibited in such small quantity will only serve to increase the irritation. I have in such cases often seen benefit by a lubricating injection of pure sweet oil, or thick congee. Iced water I have found at times afford great relief to the burning constant pain, which is sometimes seen along the rectum even when the purging may not be urgent at the time. As an astringent I put chief faith in sugar of lead in the dysentery now under consideration. It is the most soothing of all metallic astringents, and is especially indicated when there is much bleeding. Mr. Raleigh tells us that he ascertained by experiment that a pint and a half of fluid is sufficient to lubricate the whole of the large intestine. and if we contrast this with the recommendation of Mr. Hare of throwing up six pints. We may state that lubricating the intestines is one thing and filling them another. If we use a moderate quantity of fluid it may remain ; if we fill the large intestine to distension it will soon empty itself. I have not had an opportunity of trying the plan recommended by Mr. Hare. of passing a flexible tube up the rectum as far as nine inches, but I think any one who has read his pamphlet, must feel inclined

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* On the principles laid down elsewhere. and so well set forth by Dr. Graves, see note to this chapter. We may at times give opium in this way, when the head symptoms preclude its being given by the stomach. We must recollect that unless retained it is useless.

Remarks on Mr. Hare's long tube.

as I do to try it whenever the opportunity offers. Mr. Hare argues his case very acutely, but I believe there is this fault in his inferences, that they aim too directly and too much at infallibility. That such cases as I have seen of dysentery would all yield to this simple method of cure, or that they would do so generally (whether it acts by removing sources of irritation or by lubricating an inflamed surface) I cannot believe, though I would willingly do so. I have elsewhere endeavoured to shew that solid fœcal collections are not by any means common in Indian dysentery;* but Mr. Hare argues ingenuously enough that the smallest amount of fœcal matter and even the retained discharges act perniciously. His suggestion too that obstruction may arise from the abrupt bendings of the gut and swelling of the lining, especially of the villi, is worthy of further consideration; and yet, supposing the forcing power sufficient, I find it difficult to imagine why the whole intestine up to the valve may not be filled through a tube that merely passes the sphincter, as well as through one that goes up nine inches. There can be no doubt that whatever may be true with respect to collections, and the advantage of the long tube for their removal, medicines intended to lubricate the inflamed surface, to constringe over distended vessels, or to heal ulcers, should be exhibited with as much fluid as will insure their apposition to the affected surfaces; and this Mr. Hare has well and judiciously insisted on. I cannot speak from experience, but one is inclined to suppose that it cannot always be easy for the practitioner, or agreeable to the patient, to pass a tube so far up the rectum.

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* As a deviation from the healthy state of the muscular coat of the stomach, Dr. Abercrombie gives this illustration:—"A morbidly increased but partial and irregular action. This appears to arise chiefly from morbid irritability of small portions of the internal surface, the ordinary stimuli producing at these parts a morbidly increased action, with which the other parts do not harmonize. This appears to be the state that is often expressed by the indefinite term *spasm*. It is seen in the urethra &c. and a similar condition appears to occur in the bowels, particularly in certain states of dysentery, in which we find frequent irritation and morbid discharges from the lower parts of the canal, with retention of the natural fœces in the parts above."

### COUNTER-IRRITANTS.

Remarks on counter-irritation.

Counter-irritants have in the eyes of a practical man two great objections to their use—an abraded surface conceals from us the state of the subjacent parts, because we cannot manipulate, and the torture of a blistered surface to a person having to move even on a bed-pan is not to be overlooked—but milder counter-irritants than the fly blister may often be useful early, such as mustard sinapisms, stupes of turpentine, and gentle rubbing with soap liniment. Later, to remove thickening after acute symptoms have subsided, we may abrade a surface with a blister, and keep it open with advantage.*

### DIET.

Diet in dysentery.

On the subject of diet in dysentery the profession is pretty generally agreed; that it should be of the blandest description in the early stage of the disease, and given in small quantities, so as to avoid the chance of its producing irritation. But I do not think it is sufficiently acknowledged, or recommended, that, when death is threatened in an early period of the disease by too free discharges, or by sloughing, it is fully as necessary to support the powers of life by nourishing food as by medicine; and animal food we know to be the most nutritious.

Don't give solid food, say almost all writers, but liquid and bland food, in order that it may be digested, chylified and absorbed, before it reaches the affected parts—the large intestines. Is this the correct explanation of what seems certainly true, that

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* Perhaps I have not laid sufficient stress on the circumstance of the fluid passing up without, at first at any rate, filling the rectum. This it must be confessed ought to give the best chance of bringing down matter from above. Mr. Hare states very positively that fœculent matter does not lie in the rectum, and that the accumulation is always above the sigmoid flexure. It may be so in dysentery, but, if always true, why does the surgeon give a purgative or enema before operating for stone? Mr. Hare will see that Sir Geo. Ballingall particularly recommended large injections. "If," he says, "thrown up in sufficient quantity and with a tolerable degree of force, they will reach any part of the large intestines."

Diet in dysentery continued.

Remarks on the use of wine.

liquid food is the least hurtful? It may be so, but, as far as we know of the processes, it must depend upon the chemical quality more than upon the consistency of the food, how much of it will pass down unabsorbed by the lacteals and mesenteric veins. It seems probable that the circumstance of liquid and farinaceous food proving best depends upon the digestive power being weakened by the severity of the disease;* and, perhaps it is an equally fair inference that in cases where there is great debility, but where the stomach is equal to digest animal food, it may be given with advantage. Physiologists tell us that fluids are absorbed quickly from the stomach, and scarcely pass into the duodenum. How then is it that the ingestion of fluids in any quantity often sets the whole length of the tube in motion, as experience proves? The fact is certain, (however it can be explained) and indicates the propriety of small quantities of fluids in dysentery. Wine I know to be useful in certain cases and stages of dysentery, where there is a typhoid tendency, and in more advanced stages of ordinary attacks. I have stated that opium given early will check the course of a case, so will wine, especially port. The experiment no doubt is occasionally dangerous, but not nearly so much so as many suppose, for it appears to be only when constitutional symptoms have shewn themselves, or when the inflammation is at a particular stage of intensity, that stimulants act injuriously. We know that in advanced stages of inflammation stimulants are the means of cure, and there is proof that in the incubation of some inflammations a stimulant will arrest their progress. "Who has not seen turpentine supercede the best established inflammations, or black pepper, Warde's paste, do the same in the most violent attacks of hœmorrhoids."

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* We are told by some writers that the farinaceous articles of diet and milk yield no effete matter: an assertion that appears to be certainly contradicted by what we observe in infants at the breast, and in those who live on rice or even on sago. Gum has been highly extolled by some American writers as an article of diet in dysentery. Perhaps it is from the quantity of gum it contains that the *feronia elephantum*, or wood apple, is so much used by the natives in bowel complaints. I know by experience that different preparations of rice are worthy of recommendation.

Sub-acid fruits.

Quoting from this author* reminds me to notice his strong recommendation of the sub-acid fruits, and even lime juice. I cannot speak from personal experience, but I think that in jail dysentery particularly they are well deserving of trial, after the strong argument and testimony adduced in their favor by so experienced and observing a practitioner. Many of the natives of India, and the Bengalees in particular, use tamarinds and other acid fruits; an acid preparation of milk (called dhey) I have found answer in chronic cases of natives.

### SUB-SECTION.

### CHRONIC DYSENTERY.

Author's definition of chronic dysentery.

I wish to convey by the term chronic dysentery a condition of the disease where the existing symptoms depend upon a primary attack of the idiopathic character. I have mentioned that idiopathic dysentery is an inflammation of the mucous membrane, of greater or less intensity; it may end in resolution, produce early death by gangrene or sloughing, or leave a part of the membrane in one of three conditions—1st, an irritable state of the mucous surface, 2nd, interstitial thickening, 3rd, ulceration. According to my belief, the symptoms of chronic dysentery in their varied characters depend upon the combined or separate existence of these three morbid conditions. There is not a state of disease which can end in resolution or in sloughing. The irritation will subside, the thickenings will absorb, the ulceration will cicatrize, or death will occur from inanition. The progress to a fatal termination is often very gradual, and the hurry with which emaciation proceeds is the best guide we have to the danger of our patient's condition.

Conditions of the memorane.

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* Dr. W. Fergusson, with whom, however, I cannot agree when he writes—"A man can no more be seized with true dysentery from any thing he can eat or drink than he can be taken with pneumonia, ague or cattarrh." It is certainly curious why the large intestines should inflame from the injection of substances into the stomach, and small intestines that leave them uninjured, some of these do not even reach the colon. Yet it seems undoubted that they cause dysentery. Witness the waters of Candahar and the Kyber. Large doses of calomel or tartar emetic will also at times produce dysentery.

Such is my idea of what should be called chronic dysentery. In some cases of course it will be difficult to draw the line between the two kinds. A case which had passed into the chronic form may again light up into a state where fresh destruction of the parts may be threatened. Such might be called a mixed case.

Irritability of the mucous membrane.

We may suspect the irritable condition of the mucous surface, when after an attack of dysentery there are occasional attacks of griping and irregular and uncertain calls to stool with alternating watery and solid evacuations. If the irritation, or, may be, I should say the congested state of the vessels be more intense, white opaque mucus will be discharged, and even occasionally the mucus may be glairy and viscid, a little tinged with blood. If there be no ulceration or thickening, such as seriously to affect defœcation, this state of the membrane will soon yield to moderate leeching if there be any pain on pressure, to a judicious dietary, very mild aperients, and to the local effect of sedatives combined with astringents. Resisting such treatment, change of air is highly advisable and very often successful.

Treatment.

Thickening of the coats.

Interstitial thickening, the effect of dysentery, may exist without our being able to do more than suspect it: at other times careful inspection along the track of the colon will enable us to discover it. The symptoms it produces (if existing without the irritable state of the inner membrane) are constipation, a feeling of fulness and discomfort, with occasional griping; irregularities in diet, chills, &c. may exasperate the symptoms, and give pain on pressure, threatening serious obstruction and inflammation of the whole substance of a part of the tube requiring, according to circumstances, general or local beeding, with judicious purgation, for their removal. When the thickening is in a chronic inactive, state, counter-irritation, by a blister or seton over the affected part, may be necessary; and we should be careful, where we know thickening to exist, never to let the bowels become constipated. and irregularities in diet have to be avoided. Both of these conditions just noticed

Treatment.

may often be present with a tolerable degree of health, and without much emaciation; and, strange to say, there are even cases of ulceration with no prominent symptom to mark its existence. But, generally speaking, we may pretty surely infer the existence of ulceration, when the dysenteric symptoms continue unabated or only mitigated by treatment; and, where emaciation accompanies at the same time, that death is not immediately threatened. At the stage where a severe case of idiopathic dysentery is passing into the chronic, we may yet have the grumous bloody discharges mixed with shreds of detached mucous membrane or masses, of lymph; but, again, as the case passes into the condition of a purer ulceration, muco-purulent discharges occurring only at times variously tinged with blood may be looked for. The fœculent discharges are very irregular in character, but are commonly at times so watery that we might call the complaint a dysenteric diarrhœa: griping, flatulence and a feeling of painful distension are very commonly present, but of course the amount of the discharges from the ulcerated points, the consistency and other characters of the fœculent matter and all the other symptoms, vary greatly in different cases. It is wonderful sometimes how little the general system sympathises with the local disease, especially I think when the rectum is the part affected. The functions of nutrition and assimilation go on totally undisturbed, or only very partially affected. It is often, however, otherwise, and progressing emaciation warns us that the disease is wearing out the vital powers. Does the emaciation depend upon the non-absorption of nutritive matter, or upon the non-assimilation consequent upon the organism sympathising with the local affection? We talk of this sympathy familiarly, but do we understand why a small mass of ulceration in the large intestine causes the whole process of the renovation of the tissues to be obstructed?*

Ulceration of the inner coat.

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* It must, however, be admitted that we are not yet fully acquainted with the whole functions of the large intestines. They evidently take some part in the process of digestion that has not yet been accurately ascertained.

Treatment of ulcerated condition.

How are we to hope to effect or assist the healing of ulcers? By preventing the collection of matters which will irritate them—by soothing and moderating the action of the diseased parts—by direct application to the ulcerated surface; and by supporting the powers of nutrition and assimilation, not only with the hope of maintaining the functions of life, but on the chance that the wonderful process of reparation may be effected.

To prevent fæcal collection.

It is obvious that there are two ways of preventing irritating collections—the 1st, to guard against their presence, and the 2nd, to remove them when they are existent. The subject of diet in chronic dysentery is of the greatest importance, and demands the keen attention of the physician, as well as strong manly resolution on the part of the patient. Diet may be considered with reference to its nutritive quality, and with reference to the passage of its excrementitious part through the diseased organ. It is in the last point of view we have here to deal with it, and we may say at once that herbaceous vegetables are strongly contra-indicated, from our knowledge that portions of them are very apt to pass down wholly undigested.* It appears to me a more difficult question whether articles of diet should be selected on account of their containing the smallest quantities of effete matter, because we have to recollect that the symptoms are often relieved by feculent evacuations, and that such matter mixes itself with the bile, and perhaps renders it less acrid.† It may be partly in this way we can explain why the farinaceous foods are proved by general experience to be upon the whole the best in chronic dysentery, against the established fact that animal foods are the easiest of digestion, that they are the most nourishing, and that they may

Remarks on diet in chronic dysentery.

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* See Combe on Digestion and Dietetics, pages 181 and 182.

† From the circumstance of vegetables containing little aliment, and much indigestible matter, it naturally happens that a larger quantity of refuse remains to be thrown out of the bowels (when it constitutes the chief part of the diet) than when animal or farinaceous food, which contains much nourishment and little indigestible matter, is used. Hence, as a general rule, the bowels act more freely, or are more open in the former than in the latter case.—*Combe on Digestion Dietetics.*

be prepared by art so as to contain nothing but nutritious particles. We must not, however, forget that in disease, even when fever is not present, there is an irritability of the general system, apt to be excited by the stimulating quality of animal food, and that what Dr. Prout calls the reducing power of the stomach is weakened in disease. With respect to the food which will prove least irritating to ulcerated surfaces, we should also be much guided by our observation of the individual case we are treating. It is true that there is a great diversity in the facility with which different individuals digest the same article of food. There is another way in which irritating matters collect, namely by the passage down of bile and other secretions independent of chylified food. Healthy bile does not appear to irritate the inflamed surface much; but vitiated bile or other secretions of bad quality are manifestly irritating and it will appear presently will even give rise to ulceration: to correct vitiated biliary and other secretions is therefore an obvious principle of treatment. This explains the benefit in such cases of the mild action of mercury. We next have to consider the means of removing the irritating matters. The parts themselves make an effort at relief, in which they are often successful; but there is always danger of this effort being over done, when there is the risk of fresh inflammation and its consequences arising or profuse discharges occurring that at times prove dangerous. Both symptom. must be corrected in the usual manner. Mild purges, indeed the very mildest, should be brought to their assistance, whereby the offending matter will be expelled, and then we can appease the excited parts with sedatives. The irritation is sometimes so great that we may do best by first giving the sedative; and upon the judicious combination of purging* and the use of sedatives a great part of our success will depend. Perhaps there is some additional benefit to be expected by the local effect of the sedative in the form of enema.

Vitiated secretions.

Use of purgatives for their removal.

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* We may choose from among castor oil, rhubarb and magnesia, rhubarb and sulphur, sulphur and cream of tartar, senna

Direct medication to the ulcers.

Internal use of astringents.

This brings me to the treatment by direct medication. When we reflect that we have to apply solutions to a healthy and diseased surface indiscriminately, and that we cannot be sure how long or to what extent the ulcers may be touched, we need not expect much from direct medication to ulcers in the intestines.* The general astringent and sedative effect of sugar of lead is decidedly useful, and when the ulcers are far down we may hope to apply lunar caustic with benefit. The internal exhibition of the acetate of lead or sulphate of copper with opium, is often clearly beneficial. I imagine that as they pass down and become gradually dissolved, they exert an astringent effect on the membrane. If this is the way they act, I admit that it is a strong argument in favor of astringent injections used in large quantities. But they may act by absorption, as we see the astringent effect of the acetate of lead in hœmoptysis. This will appear more probable, when we reflect on the great length of the tube and the part of it which is diseased.

Salivation.

Diet and wine.

I have not yet spoken of salivation as a cure for chronic dysentery. If we consider the high praise bestowed upon it by former practitioners, we may be inclined to think that it has been too indiscriminately abandoned. We may hope best to support the powers of life and to give a chance of the ulcer cicatrizing, by giving diet as nourishing as the other conditions of our patient will admit. I refer to what is said on this subject two pages back; and wine here is often useful when it increases the digestive power and strengthens without hurrying the circulation. Tonics are useful on the same principles—quinine, mineral acids, &c. But we know that the mere passage

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with salts or with manna electuary of senna according to circumstances and as we find them agree with the patient.

* Professing to write in an unbiassed spirit, I ought not to omit to mention how confidently Mr. Hare writes of the success of the long tube in chronic dysentery. He recommends that the bowels be emptied daily by large water enemata, and then to throw up 2½ to 3 pints of water with 15 grains of caustic dissolved in it, or the same quantity of bark decoction or catechu and chalk.

into the blood of nutritive matter is not the only circumstance necessary to the due performance of the blood making and blood purifying processes. The effect of pure air upon these processes so necessary to maintain assimilation, and more especially to restore it, is beyond all question. And there is another circumstance well worthy of our consideration here, namely, the effect of nervous influence and especially of pleasing mental emotion on the digestion and on the functions of assimilation. I quoted at page 139 from Professor Alison; I now offer a later illustration of the same principle.

Effect of pure air and pleasing mental emotions.

"The influence of mental emotions upon the processes of secretion is still more unequivocal, and we have here also positive proof that it is exerted, not merely in diminishing or increasing the activity of these operations so as to modify the quantity of their products; but also in changing their character, so as to alter the quality of these. For example, the mammary secretion in a nursing female is augmented whenever the idea of the infant is strongly brought before the mind, whether by its actual presence, or by a vivid conception in its absence; and it is frequently diminished or altogether suspended under the influence of strong emotions of a depressing kind. The continuance of such emotions less powerfully excited, is well known to alter the quality of the milk so as to render it unwholesome for the child; and there are cases on record, as we have already mentioned, which indicate that this bland nutritious secretion may be converted in a few moments into a deadly poison, under the influence of violent passion. Now although it seems possible to account for changes in the activity of the secreting process by the control which the nervous system is known to possess over the calibre of the blood vessels, yet no such explanation will account for such a perversion of it as that to which we have just alluded; and we see no other means of accounting for phenomena of this kind, than by attributing to the nervous system some kind of participation in or control over the process of vital chemistry.

"We have alluded to this subject for the sake of supplying a deficiency in Mr. Paget's treatment of it, which rather surprises us; since one of the most direct and positive sources of proof of the close relation of the nervous force to the formative processes, is afforded in our apprehension by the manifest influence of mental states upon the secreting operations."

It is upon these principles that change of air and a contented and happy state of the mind contribute to the cure of chronic dysentery. A very slight change of locality, even when the quality and temperature of the air are little if at all altered, experience shews us has often a good effect; and in this instance the change in the patient's mental emotions, the hope excited by the change and the pleasing effect on the mind of new scenes and circumstances, must have a good deal to do with the improvement.* When the change includes a removal to a better climate both principles come more fully into action, and a sea voyage to Europe involves the climax of both. The bracing and salubrious sea-breezes free of all terrestrial contamination, the hope of visiting the scenes of our boyhood, these in many instances have cured and will cure cases of chronic dysentery. We may slightly alter the saying that is as old, I believe, as the days of Virgil, and it will apply here: "Cœlum et animum mutant qui trans mare recurrunt." Many a bold spirit has passed away on the great deep, and the bones of many a brave man are lying embosomed in its unfathomable caves, because this, the great resource in chronic dysentery, was too late resorted to.

### CONSTITUTIONAL OR COMPLICATED DYSENTERY.

Dysentery may be complicated with disease of other organs.

The disease of some organs supposed to increase the liability to dysentery.

Dysentery may be complicated with disease in other organs, and it was then I proposed to call it constitutional dysentery, perhaps complicated would have been a better word. With reference to some organs it is not only true that dysentery is more fatal when they are also affected, but that it is more apt

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* This sort of change is more appropriate and more useful in the early stage of the disease.

Disease of the liver particularly.

to arise. So long has this truth been recognised with relation to the liver, that some have supposed dysentery to be always accompanied by disease of that organ. I do not believe quite so far as this; but the frequency of liver disorder, functional or organic, as concomitant of dysentery must, I think, be acknowledged. It is a very common attendant upon liver abscess.

Remarks on dysentery complicated with liver affection.

It occasionally would seem that the absorption of pus from dysenteric ulcers causes suppuration of the liver; but the frequent association of all is chronic disease of the liver not terminating in abscess with dysenteric symptoms, and it is doubtless here that mercury proves so useful. We should never fail to explore the liver, and to learn the history of our patient with reference to hepatic affection. If there are symptoms of abscess, medicine will do little beyond palliating symptoms and relieving suffering; but when we meet with the various grades of acute and sub-acute inflammation, or congestion liable to terminate in abscess, in enlargement, or in pale granular hardening with diminution of size, it must be part of the treatment to remove these. Functional derangement of the liver unaccompanied by any marked organic derangement,* I have already stated to attend almost all cases of dysentery. There is a difficulty in saying which is the cause here and which the effect. It is reasonable to suppose that a deranged secretion from the mucous membrane, such as we have in dysentery, may affect the hepatic secretion; but, on the other hand, we have to remember that disordered function of the liver marked by similarly altered secretions often occurs without dysentery, and in the absence of all obvious signs of organic affection. We may meet with dysentery accompanied by obvious hepatic affection with the mucous membrane and the discharges from it in any of the several conditions I have endeavoured to describe, and giving a due consideration to the liver affection it must be treated according to the instructions offered.

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* As functional disease implies a proportionate certain amount of change in the molecular structure of organs, either primary in the organ itself, or secondary to changes in the blood or vessels, the most delicate test of the condition of an organ will in time be the chemical constitution of its secretion, when this knowledge is attainable.—*Copied from Parkes on Dysentery since the text was written.*

Mr. Parkes' work on dysentery noticed.

I had written thus far when I got the first opportunity of perusing Mr. Parkes' work on dysentery, for my first notice of it depended on a review I had seen in the Foreign Quarterly. After perusing the work on cholera by the same author, I was prepared to find here ingenious reasoning and original views on the morbid anatomy. On the subject I have just had under notice—the connexion between dysentery and liver abscess, there are many interesting and original observations. Mr. Parkes considers that dysentery is an effect and a cause of liver abscess; and in the latter case not, he imagines, by the absorption of pus, but owing to some unexplained connexion between the liver and the mucous membrane of the large intestine. I confess to a limited experience of the disease called deep-seated abscess of the liver, and perhaps this may in some measure warrant my entertaining the belief that its connexion with dysentery is more co-incident than essential; for I was in charge of a civil jail for fourteen years, where death by dysentery was awfully common, and where I made many post-mortem examinations. The same absence of liver abscess is mentioned by the medical officer in charge of the Milbank Penitentiary, Dr. Baly, after numerous dissections.* Mr. Parkes' observations were made on European soldiers, with whom liver disease is proverbially common, as is dysentery also. I have shewn that dysentery is fatal without liver abscess. The observations of Mr. Martin and others will equally prove that liver abscess may cause death without dysentery. Indeed my own limited observation would lead me to say, that diarrhœa was a more frequent co-existing condition than dysentery. Mr. Parkes has a most valuable summary of

His opinions on liver complication.

Observations of the author on the same subject.

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* "Among the many hundreds of cases of dysentery which have occurred in the Milbank prison during the last seven years, not one has been complicated with hepatic abscess. The medical records of the establishment too, which reach back to 1824, afford no grounds for even a suspicion that such cases ever occurred among the prisoners."

Original views of Mr. Parkes' regarding dysentery generally.

the morbid conditions as indicated by the character of the discharges. What is chiefly original, is the view that ulceration is an early condition; that cicatrization often occurs and takes place by the effusion and organization of lymph, not by granulation; that in chronic dysentery lymph is constantly being effused in inordinate quantity, causing thickening of the coats, irritating the mucous membrane, and preventing the healing of the ulcers.

### SPLEEN DYSENTERY.

Peculiar symptoms of spleen dysentery.

Modifications required in the treatment.

Dysentery is often met with while the spleen is enlarged, and the constitution in that state of cachexy which spleen disease produces. How far the co-existence is coincident or essential I do not stop to inquire, further than by observing that whatever greatly affects the amount or the quality of the secretion from the mucous membrane seems capable of causing dysentery. In spleen dysentery the symptoms of inflammatory action are very subdued, requiring a corresponding depletive practice. It is almost a diarrhœa more than a dysentery, the discharges being usually very watery.* In the treatment there are two chief points in which we must depart from the approved principles of treating either disease if it alone were present. The use of mercury is contra-indicated as a cure for the dysentery, and the exhibition of purgatives so successful in simply enlarged spleen is inadmissible. The dysentery will be best treated with the mineral acids, mild astringents and sedatives; while the various preparations of iron and iodine combined with tonics may be tried for the disease of the viscus. This is another kind of dysentery, where change of air is almost invaluable.

### JAIL DYSENTERY.

Jail dysentery treated of separately in a practical, more than in a scientific, point of view.

I put this down as a separate kind of dysentery more in a practical than in a scientific sense: for although my experience in the practice of a jail hospital enables me to say that the vast majority of cases of dysentery there occurring, present themselves in individuals whose general health is impaired, and this seems proved also by the percentage of mortality; yet I know there must be some cases which are strictly idiopathic. Practically the subject is of great importance; the prisoners in Bengal and the Upper Provinces amount to more than forty thousand and the mortality among them from dysentery has already been noted down. Its treatment is very unsuccessful, and this renders it more important to discover its causes, and to remove them if that be practicable. The contagionists will say, it spreads among prisoners by contact or contiguity. My answer is, place them in purer air, work them moderately, clothe them well, feed them sufficiently, the disease and the contagion will depart together,—one a substance, the other a shadow.

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* In this dysentery, the lower part of the ilium will often be found inflamed, and sometimes ulcerated.

The subject is important, as the disease is so fatal.

Question of contagion.

It is malaria, say the Maccullochians and Coplandists, who put down malaria as a cause of dysentery. I ask them, whether they have proof that malaria ever caused dysentery in strong healthy men; or whether they ever saw the combination of intermittent or remittent with dysentery, except in those who have been exposed to depressing influences as well as to malaria.* The reader will anticipate that I attribute the frequency of dysentery in jails to the peculiar position of prisoners, as regards ventilation, clothing, labor and food; that because by reason of their general health being impaired, the usual causes of dysentery affect them more readily, and that for the same reason the mortality is greater. A paper published lately by Dr. Strong, an officer who has had immense experience in jail practice, proves incontestibly by figures that a more generous diet in the Alipore jail has greatly lowered the per-centage of mortality; and as dysentery is the great disease of jails, we may conclude it has been proportionably influ-

Question of malaria as a cause of dysentery.

Real causes of jail dysentery.

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* I do not believe that malaria can cause dysentery, except by its gradual effect on the organism; but I do believe that it may greatly modify its symptoms and the treatment required for its cure.

enced. For proof of the ill effects of the existing accommodation, I may refer to that part of the report of the Inspector of Prisons alluded to in a note to page 11, and to the general laws by which the human organism requires a certain quantity of air for its healthy action, and that the purer such air is the better; clothing, and labor when not over-exacted, play but a subsidiary part, though both demand attention.

Peculiar symptoms of jail dysentery.

The chief peculiarity in the symptoms of jail dysentery is in the subdued character they exhibit, taken collectively or separately. Death does not arise from high inflammatory action or often by sphacelation, but from ulceration; and I do not think those who have dissected many prisoners can be of opinion that the effusion of lymph, an action of the vessels usually imagined to occur in a healthy state of the system, prevents the healing of the ulcers.*

The low range of the inflammation, and the comparative absence of the discharges denoting an intensity of that condition, being the negative characteristics of jail dysentery; the positive ones are the freedom of watery discharge, the almost diarrhœal character of the disease, the slowness but sureness of the progress to death, and the peculiar puffiness of the face, the dry furfuraceous skin, and the swelling of the feet and ancles in the latter stage of the disease. Of the treatment I will say, that I know of no situation more disheartening than having to prescribe for such cases. We have to drive nails into rotten wood, and often we tear away a piece of the plank that has kept the ship from sinking, unless we strike with a delicate hand. Give me the benefit of pure air and change of diet, I would feel inclined to exchange for them all the drugs in the pharmacopœia. The ends of public justice deny the first to the full, though I am glad to see that improved ventilation, accommodation and purification are progress-

Remarks on its treatment.

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* These, the ulcers, are about the size of a six-pence or larger, with angry red inflamed edges, while the whole surface of the ulcer is covered with a greenish yellow tenacious matter or crust, not unlike the slough of the carbuncle.—*Professor Goodeve.*

ing. With regard to the second, I believe that there is a call for improvement in the dieting of most jails; this more perhaps as regards variety and quality, than with respect to quantity.

Depletion will do good in some cases, but it must always be moderately used, and the other remedies, I have recommended for common dysentery with the same precaution prove useful. Many cases will shew a state of cachexy almost amounting to land scurvy. Here mercury is contra-indicated, and a great part of the cure will depend on a change of diet, such as is known to be suited to the scorbutic diathesis.

## DIVISION II.

### REMARKS ON THE MANNER IN WHICH THIS CLIMATE MODIFIES VARIOUS DISEASES.

"From a review of the whole subject considered in this section, it appears that the great catalogue of diseases which afflict mankind are common to the whole human family. They differ in different climates, and local circumstances often engender a pre-disposition to particular disorders in races which have long been subjected to their influence."—*Extract from Pritchard on the Physical History of Mankind.*

Effect of climate in modifying disease.

To the above quotation, however correct in itself, we may add that when races or individuals make sudden transitions of climate, they are prone to certain diseases; and observation upon the offspring of European residents in India, shews us that an impaired condition of the organism descends. It would be an interesting inquiry, how far the diseases of the various races and castes inhabiting Hindoostan depend upon or are modified by climate, and how far by social and political position. Time and space warn me that this, and the remaining subjects I proposed to discuss in this chapter, must be disposed of very briefly.

In the first chapter, while I endeavoured to point out the causes of disease in the community and to inculcate the advantage of guarding against them, I stated that due caution would prevent undue mortality; but though this is true, it goes itself to shew that this climate is not favorable, to the European constitution. Those who have to expose themselves on foot to out-door vicissitudes, especially to the rays of the sun; who live in hot houses near the level of the ground; and in short who want the appurtenances that render the climate endurable during the hot months and rains, are very liable to disease. It may be stated in a general way that the brain and the skin are the organs which receive the first impression from the extreme heat. The nervous impression upon the first named organ, is apt to derange the balance of the circulation; and the latter, with a large surface exposed to outward impression, while its vessels are gorged, and its nerves excited, adds to the general derangement in the balance of the circulating fluid: experience shews that the abdominal viscera receive the shock of any sudden impression made upon the external surface.

Effect of climate on the European constitution.

The effect of direct exposure to the powerful rays of our hot weather sun—indeed I believe I must add of very intense heat without exposure—is an important subject, because the affection of the brain produced is a cause of great mortality among the troops. One would suppose on reading the following passage from Professor Alison, that it would not be difficult to distinguish between the two morbid impressions on the brain produced by intense heat;—" The effect of very intense heat applied to a pretty large surface of the body as in an extensive " burn, or to the whole body as in the case of a coup de soleil, " is also quite similar to that of concussion; there is often " insensibility, and always when the case threatens the most

Effect of heat upon the brain.

Quotation from Alison.

" immediate danger; there is the characteristic depression " of the heart's action: and when recoveries take place from " the state of collapse as it has been called immediately succeed- " ing such injury in its extreme degree, it is often under the use " of stimulating remedies."

But intense heat of the sun in other circumstances, especially as it would seem if acting more gradually on a stronger habit of body and when there has been less exhaustion by muscular exercise, has often produced a state of insensibility in which the pulse has been fuller than natural, and the vessels of the head unnaturally gorged; and which has been fatal in the way of coma as above explained, or been relieved by copious evacuations and cold applications; and the same cause has often produced other diseased conditions, connected with a derangement of the action of the vessels of the head. In this case, the most injurious effect of the heat is evidently on the vascular system, exciting the action of the heart and probably expanding the blood in the vessels, and the brain suffers " probably from increased compression by the blood; whereas " in the former case, the first and chief effect of the heat ap- " pears to be on the nervous system, and the heart suffers from " the violent impression made there."

Remarks on the above with reference to heat apoplexy in India.

It were well for the Indian practitioner that in treating head affections in the hot months he could always say, without hesitation, to which of the above conditions each individual case belonged. This is a case of nervous depression, I must stimulate to rouse the energies of the brain. That is a case of compression from vascular fulness, I must deplete to relieve it. There are cases where, with a full bounding pulse, a flushed face and hot skin, bleeding is certain death. I believe that we meet with this condition when it has not been preceded by any state of nervous depression resembling concussion, by which we might judge we had to deal with vascular re-action and not with compression. The fatality of this affection would seem to show that it is not always possible to discover the best plan of treatment; and for this reason, notwithstand-

Danger from bleeding.

ing what has been written by Lindsay, Mouatt, the late inspector Murray and others, the subject is worthy of further investigation in order that if possible it should be ascertained with precision where bleeding is or is not indicated. I have had no practical acquaintance with this disease for many years, but the impression of the danger of bleeding is yet strong on my mind. At this station during the present season, after the lancet was found to fail where it was seemingly indicated, the cold affusion was applied with excellent effect, followed by leeching and even general bleeding; derivative purging was also part of the plan of cure. Having an impression from my reading and from some past experience in this deadly affection, that where bleeding was not admissible there would be a hurry, a jerk, or a want of full volume in the pulse, I have conversed on the subject with the zealous and talented officer in whose practice the cases have occurred. He assures me, that he only saw the danger of bleeding in some cases by the effect. He seemed to dwell on the great heat of skin particularly over the head and face as very peculiar, and perhaps this symptom may contra-indicate bleeding.

Notice of the disease as it prevailed at Cawnpore.

History of heat apoplexy.

Solar apoplexy is clearly a misnomer for this disease—heat apoplexy is perhaps a better appellation. We often see soldiers exposed to very high ranges of temperature, and even to the direct rays of the sun, without even one person suffering; while at other times the disease would appear to attack as an epidemic, and as if its invasion depended upon something besides mere heat. These observations are by no means intended to argue against the necessity of avoiding exposure and the use of ardent spirits. These, if they do not always bring on the specific disease under notice, are yet abundantly productive of mischief, and we may be sure that they pre-dispose to it. The heat apoplexy would appear to occur most frequently in a close, sultry, dry, still atmosphere. It often attacks soldiers in their barracks at night, and is especially common on a line of march; so that fatigue would appear one of the most active causes, added to extreme heat and may be to some specific condition of the atmosphere. The recent examples of the disease in Her Majesty's 14th Dragoons and in the 32nd Foot especially on its march from Umballah to Ferozepore, seem to prove that the disease appears without the aid of immediate indulgence in drink, and that there is something necessary in addition to a high range of temperature with a still atmosphere. On its march from Umballah to Ferozepore, the 32nd suffered little, except on one particular night, while I believe the heat must have ranged pretty equably. On the night, in question several casualties occurred, while the energies of the whole regiment are described to have been prostrated in a very remarkable manner, as suddenly to be restored the disease also ceasing, on the wind changing.

Heat apoplexy compared with the disease of the same name in Europe.

From this disease natives are not exempt; but with them, I believe, it is only observed as the effect of direct exposure to the sun's rays: this might perhaps throw some light on its nature. But I must conclude this part of my subject, so hurriedly and imperfectly handled, by remarking, that if we bear in mind the present state of opinion as to the necessity of bleeding with discrimination in European apoplexy, perhaps the great generality of cases of the disease now under notice would arrange themselves as pure, serous, or sanguineous apoplexy; and that those which do not admit of such arrangement, are probably modified by drinking, or by direct exposure to solar influence. If there is truth in the theory of the antagonism of disease, there seems to be more in the illustration apoplexy offers, that extreme and opposite causes can produce the same effect. This might be called the substitution of causes. In cold countries we have low ranges of temperature causing apoplexy: here the very opposite condition of the atmosphere. The cold country seems to have the advantage in this, that intense heat, when it does not cause apoplexy, may yet produce inflammation of the brain or its membranes, or ardent fever with head complication.

Effects of heat on thought perception and volition alluded to.

The more gradual and less appreciable effect of this climate on the great nervous functions of thought, perception and volition, I can but barely allude to. The power and the wish for voluntary motion yield gradually to the general depressing effect of prolonged heat. Thought and perception we know act through material organism that partakes of the general impression; but it may go to the proof that these faculties are something above the mere phenomena of organization, that they do yield so little, and that there is a will and a power in the individual to overcome the depressing influence.

### FUNCTIONS OF DIGESTION, CHYLIFICATION AND EXCRETION.

Functions of digestion do not seem impaired in the natives of this country.

One who is even superficially acquainted with native habits, will not think that mere heat prevents a human being from consuming food in ordinary quantity and of every quality; and that doing so is quite incompatible in them at least with the enjoyment of health. I know not of any facts to prove that the low pariah castes of this country, who will eat animal food of almost any kind, are cœteris paribus more unhealthy than the higher castes who live upon purely vegetable diet; and there is figured proof that in Calcutta the Mussulman who eats animal food is healthier than the Hindoo.

Loss of appetite in Europeans.

I am not sure indeed that the natural and untampered appetite for food can be called less in the natives of this country than it is in a cold climate: I know that those who have the means consume immense quantities of food. Whence then is it that all writers on Indian diseases put down excesses in diet as one of the chief sources of disease? Because the system of an European is so affected by the change to a hot country, that a full stimulating diet proves indigestible, stimulating and inflammatory; but the observations just offered would seem to shew that after due acclimatization, an improved diet might not only be safe but advisable. The effect of the heat upon an

European is almost always to impair his appetite.* If he tries to counteract this by condiments and made dishes, the effect does not often fall on the stomach; for, as I have said elsewhere, that organ bears a great deal of bad treatment with impunity and when it does suffer, I am not aware that the pure dyspepsia of India differs in any essential particular from the various kinds of the same complaint we meet with in other climates. But there is an adjacent organ of great importance, the functions of which are curiously connected with digestion, and which the universal voice proclaims to be subject to the influence of tropical heat beyond any other in the whole economy.

Effects of heat on the function of the liver.

There are two different theories, each having supporters to account for the prevalence of liver disease in India. The one, that as the lungs perform a lower amount of decarbonizing function, the liver is called upon to perform more, a view of the subject supported by comparative anatomy, which shews the liver and lungs in antagonizing development: the other that there is a sympathy between the skin and the liver by which their functions play in unison. Even if I were not necessitated to bring this work to a speedy conclusion, I fear that I could not untie this controversial knot; but practically speaking, it is certain that the European in India, and perhaps in a less degree the native, is subject to increased amount of liver disease, increased and irregular flow of bile with active congestion in the earlier periods of exile, and torpid or diminished secretion with passive congestion at a later time. These differences will also exist to a certain extent at the change of seasons. We may consider briefly the effect of deranged biliary secretion on the general organism, on the functions of the intestines, and on the liver itself.

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* Probably because the deranged balance of the circulation affects the secretion of the gastric juice; but, perhaps because the diminished inhalation of oxygen by impoverishing the quality of the blood, lowers the quality or the quantity of the gastric juice. This impaired appetite continues to a certain extent every hot season. In the cold season there is a return of appetite in most persons.

Practical remarks, redundant and deficient bile.

It seems true to my apprehension, that however the matter may stand with regard to the vicarious action of the liver and lungs, the former may be discharging large quantities of its own secretion without the general system appearing to benefit, and that on the other hand the secretion of bile may be suspended for a time without any detriment. We see bilious diarrhœa running on for days, making no good or bad impression on the system; we may check it without injury: and every experienced man has seen in young and old subjects stools passing for days without, as far as we can judge, a particle of bile in them, unattended by jaundice or any general symptom. When bile is secreted but its flow into the intestines obstructed, jaundice arises, a disease frequently met with in this country, particularly late in the rainy season. It is difficult to account for its prevalence at this particular time, but it usually would seem to depend upon some local and temporary obstruction. I have seen cases of jaundice fatal in natives by coma; and we should never forget that such fatal constitutional effects do sometimes arise from it. Purging is the great remedy; but if the ducts are not permeable, I confess that I cannot see the advantage of giving mercury to increase the secretion of bile. The yellow tinge of the skin which is observable in old Indian residents, depends of course upon a partial absorption of bile into the general circulation; and it would seem that this oftener arises from obstruction of some of the minuter biliary ducts, than upon over redundancy of secretion. It is in fact the effect of chronic disease of the organ, and is only noticed here as a constitutional effect of biliary derangement to which the system has learned to accommodate itself. There is more or less bile in the blood without its appearing to disorder any important function.

Jaundice.

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* I am not ignorant that the non-secretion of bile is supposed by some to cause death by coma, but it seems to me that we want proof of death ever having arisen except where the bile had been formed by the liver but was afterwards absorbed into the blood.

Effects of biliary derangement on the functions of the intestines.

The effect of biliary derangement on the functions of the intestines, is about as important a question as can be mooted. We have to recollect that bile flows into the duodenum when that part of the tube is receiving chyme from the stomach; that a process there and further down takes place, by which the nutritious part of the food is separated from the excrementitious. It is supposed that in this process the bile is decomposed. However this may be, it is beyond question that a good deal of the products of the change are carried back to the liver by the mesenteric veins, whose branches go to form the vena portæ; so that not only will the nature of the changes happening on the admixture of the bile and food (the pancreatic secretion must be included) depend upon the quantity and quality of the bile, but the properties of the blood going to the liver destined to secrete bile will also be modified by the perfection or otherwise of the process. This subject is still involved in much obscurity; but these observations may go to explain in part the connexion which has been acknowledged between indigestion and chronic liver affection. It seems a confined view of indigestion to limit the source of its symptoms to the stomach alone; at any rate it is certain that deranged functions of the liver and duodenum cause many symptoms usually called dyspeptic. We cannot measure the amount of bile requisite for the due chylification of food; but we know that if present in excessive quantity, it irritates the intestines and causes purging. This sort of diarrhœa is recognised by the bilious color of the discharges.

Bilious diarrhœa.

This bilious diarrhœa is often produced by excess in diet by those whose livers are active in function, and strong exercise with exposure will often occasion it. It is especially prevalent when we have the most sudden changes from heat to cold in this climate. If mild in degree, it works its own cure, and no doubt may save the liver from a state of congestion. The bile sometimes passes into the stomach producing nausea and vomiting. When we have constitutional symptoms attendant upon free bilious discharges, we may always suspect that the complicated circulation of the liver is in a state of derangement—the active state of congestion dependent upon an increased flow of blood to the organ. The treatment of bilious diarrhœa does not accord very well with the theory of its cause. We would not suppose it well to give mercury when the liver is already over-acting. It would be better, we might think, to emulge the intestinal vessels by watery purgation so as to diminish the flow of blood to the liver. This, with spare diet, I believe, will be found the best treatment in ordinary mild cases of decidedly bilious purging; but when the disease is so violent as to amount to bilious cholera, calomel and opium I have found by experience the most effectual remedies to check the immediate symptoms. We must look afterwards to the state of the liver. Free discharges of bile vitiated in quality, green, viscid, or black pitchy evacuations will be met with in bad fevers, or in those who have been long in the country. They often give rise to severe griping and constitutional disturbance. Mercurials combined with opium when the pain is severe, and saline purges to remove them quickly and to dilute them, are the best medicines.

Its treatment.

Vitiated bile.

Suspension biliary secretion causing duodenal indigestion and liver congestion.

Temporary suppressions of bile secretion into the duodenum produce symptoms of indigestion some time after eating, a sense of fulness with eructation, &c.; the bowels are at the same time constipated, and there is often a sense of weight and fulness in the right side. This condition is perhaps identical with the duodenal hepatitis of Mr. Parkes, as described by him in his work, which I have lately seen.* According to him, the liver affection is quite consecutive to the duodenic dyspepsia; and yet it would seem that there is temporary diminished secretion of bile, and therefore functional derangement of the liver, for he mentions that constipation is a very common accompaniment of this kind of dyspepsia. This co-existence of symptoms of dyspepsia, constipation and fulness, sometimes amounting to tenderness or pain in varied proportions and intensity, constitute the great mass of cases of liver complaint and dyspepsia we meet with in India. At first the dyspeptic symptoms are most prominent, the biliary derangement alternating in stoppage and in redundant flow from the liver, with consequently relaxed or confined bowels. After a longer residence the secretions from the liver are permanently scanty and vitiated, the appetite is impaired, the duodenic changes are imperfect leading to emaciation, and the want of stimulus from bile to the large intestines causes constipation and scanty excretion. The earlier and more acute cases of this biliary dyspepsia are caused by diet too heating and too large in quantity, and by excessive exercise especially if accompanied by exposure. It will be removed by low living, by leeching, by avoiding strong exercise and exposure, and by free purgation.

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* Mr. Parkes is of opinion that the congestion of the liver caused by duodenal dyspepsia is in the texture between the lobules, and that it is not common for it to run into abscess.

Treatment.

The state of the disease dependent upon the more permanently diseased condition of the liver—a condition which is produced by long continued increased action and by the congestion which so commonly attends the fevers of this country—we can only hope to palliate, unless we can give our patient the benefit of a cold climate; and although the symptoms may exist long without inducing serious consequences, they produce much discomfort and great mental depression. Exercise and cheerful occupation, light nutritious diet, aperients, and those that act in increasing biliary secretion in particular, such as blue pill and taraxacum combined with the vegetable extracts or mild salines, are our chief resources.* In the earlier stages of these derangements of the bowels consequent on liver derangement a residence in the hills will often restore health, but when of long standing a voyage to Europe becomes necessary. The connexion of the other prevalent diseases of the intestines with biliary derangement is a question which is yet

A more chronic condition with its treatment.

Other derangements of the intestines from vitiated bile.

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* I can give testimony in favor of nitric acid given internally or used as a bath.

obscure, though none can be more important. The diseases I allude to are diarrhœa, dysentery, and the obscure affections of the cœcum and colon, which are often mistaken for liver affection. There is one kind of diarrhœa we meet with here, which is evidently attended with disordered function of the liver; but I confess my ignorance of the essential condition or conditions whence it arises—that along with the absence of bile there should be a profuse discharge of pultaceous, chalky looking matter, or perhaps the appearance is better described by comparing it to a thickish mixture of flour and water. In Dr. Mason Good's first volume, a disease which I would call identical with this is described; but he speaks of a chronic dangerous disease almost incurable—diarrhœa gypsata.* The diarrhœa I allude to, and I do not at this time recollect to have seen it particularly described, is oftenest seen in children, and is best treated by mercurials—the purging or other symptoms are seldom urgent; I have learnt by experience not to feel alarm at its appearance. In adults, who can tell their sensations, there is often a sense of fulness in the side, but I have never known it lead to serious consequences.

Pultaceous diarrhœa.

Diarrhœa independent of liver disorder.

Having briefly noticed diarrhœa that is dependent on the redundant or scanty flow of bile, I would now notice the disease as it is dependent on the state of the stomach and bowels—we may add of the pancreus, although ignorant of its connexions with bowel disorders. Mr. Parkes, at page 189 of his work, has some very interesting remarks on the subject of intestinal evacuations. He considers that there is a kind of yellow stool, where no bile is secreted, and that the color is derived from the pancreus or bruner's glands. He says it will not be found when diseased pancreus compresses the ductus choledocus; and that we may have it with pervious ducts while the state of the gall-bladder shews no bile to be secreted. I have already alluded to the imperfection of our knowledge regarding aloine discharges.

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* Dr. Good ends his notice by saying: We call it a secretion of lime, because it has all the appearance of being so; but I have promised Dr. Baillie, who has just seen this sheet while passing through the press, to add, that its calcareous character has not yet been put to any chemical test.

If it be true that in Europe the diseases of the stomach are often misplaced to the liver, though I am myself of opinion that the most distressing symptoms of dyspepsia come from the duodenum or liver, I believe it is still more correct to say, that some of the diseases of the intestines we meet with in this country are often erroneously attributed to liver derangement, and that diarrhœa is one of them.

I define it to be a state where there is frequent liquid discharge from the bowels without blood, or mucus without any conspicuous coloring from bile, nor yet with the white pultaceous appearance lately mentioned. We need not feel surprise at the varied discharges the disease may yet exhibit, if we reflect upon the variety of the injesta, the extent to which they may be digested or otherwise, the changes from mucous to serous discharges variously mixed or separated, that the bile will of course occasionally be commingled; and lastly, that as some have supposed the secretion of the pancreas gives a peculiar color and appearance in some cases.*

Diarrhœa is very frequent in this country, the powers of digestion we have stated to be often weakened. Too much or indigestible food will act as irritants, hurry the peristaltic movement, and increase the amount of secretion for a time. This is the fœculent diarrhœa, I think by far the most common effect of overloading the stomach in this country, as I believe that undue irritability of the mucous lining is all but universal.† Permanent diarrhœa, the effect of what we may imagine to be an erethism of the mucous coat, will be increas-

Its occasional danger and obstinacy.

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[*] Thus not unfrequently the evacuations are at the same time bilious, mucous and serous—or fœculent, bilious and mucous—or watery and bilious.—*Dr. Copland.*

[†] When the biliary passages are open, and the liver disposed to secrete freely, the extension of this irritation along the ducts may cause the diarrhœa to take on a bilious character.

ed by free living, and by indigestible substances, but will persist with the blandest diet in some cases for a long period : and it is wonderful to contemplate how due nutrition can be effected, and how long in such circumstances the disease remains stationary. But progressing emaciation should always warn us of danger, and teach us that the mucous membrane or some of its follicles are more seriously affected.

Treatment by change of climate.

I have seen this complaint obstinate, unmanageable, and threatening life on the plains of India, but yield to a change to the hills. Because diarrhœa is rather a prevalent complaint at our hill stations, I believe medical men are deterred from recommending this change. I can speak from experience, that very desperate cases of diarrhœa are sometimes cured by a removal to the hills ; but not having seen diarrhœa in these localities, I am unable to say upon what principle it can be explained that their climate is favorable to the diarrhœa of the plains of India. One thing is clear that the diarrhœa of the hills does not seem nearly so dangerous : perhaps the yellow straw color of the discharges will mark the distinction as well as the danger.*

Distinction between diarrhœa of the small and large intestines.

I am inclined to think that there is not a sufficient distinction drawn between diarrhœa caused by diseased conditions of the stomach and small intestines, and that which is consequent on disease of the cœcum and colon ; certainly they may both exist together, but it is also true that either may be met with separately. In the first we shall have the stools immediately after the ingestion of food ; and I think I have observed that as there is less irritation of the large gut, the evacuations may be retained till they accumulate largely. In colonitic diarrhœa again, the desire to evacuate comes on later, but is more urgent. This kind of bowel complaint is usually a sequela of dysentery, and will often lead to slight mucous and bloody discharges.

Treatment of diarrhœa again alluded to.

I have little to remark on the treatment of diarrhœa beyond always advising a change to a cold climate, when the disease is evidently making an impression. It may enforce the advice to remark, that at first it is usually a disease of the hot weather, ceasing with the advent of the cold season, but often again to return. Of course it will be advisable to avoid undue exposure after a great change of climate, nor should the invalid trust for a considerable time to mere climate alone. In treating Indian diarrhœa, purgatives are much less admissible than in Europe—a proof it would seem of the generally irritable state of the membrane which I have noticed.* Regulated diet is above all things important; and in this, with astringents, opiates and antacids, consist the means of cure. Port wine, although it is not strictly speaking a medicine, is often as good a prescription, and certainly as agreeable a one as most we have to offer. When it is contra-indicated, there will be some sign of inflammatory action, which will require to be subdued. Mr. John Tytler years ago described a deadly and common form of diarrhœa among the natives, to which he gave the name of hectic diarrhœa. Mr. Parkes, on whose ingenious views in pathology I have ventured to make some remarks, expresses a belief that tubercles are often present in the lungs of natives without softening, and therefore without producing manifest chest symptoms—death arising by diarrhœa: and Professor Webb, in his Pathologia Indica, has expressed his belief that in many cases of dysentery in children tubercalous matter passes off by the intestines. The further investigation of these points will prove interesting.

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* This character of discharge, according to Twining, is accompanied by a flaccid pale ex-sanguined state of the liver.

Diarrhœa as connected with tubercular disease in India.

Dysentery considered as the effect of biliary derangement.

Having thus noticed the effect of biliary derangement on the general system, leaving however without mention its connexion with fever, as that disease has already been considered; and having also stated how far the common derangements of the intestines we meet with can in my opinion be associated with disorder of the hepatic function, I have next to consider the connexion between dysentery and the secretion of bile. When treating of dysentery in a separate section, I made frequent allusion to the irregular action of the liver, which is observable in the progress of that disease; but the question is, whether such irregular action is the cause of the dysentery or the effect of it. If Mr. Hare's treatment be really as successful as its now numerous advocates affirm, it would seem that this long mooted and keenly contested point is at once settled. The long tube raking as it is cannot reach the liver. If it cures one case, it shews that case could only have depended on local irritation. If it cures all, it shews that dysentery is always a local affection of the intestines, and perhaps this observation is a good answer to those who boast of its infallibility. For though I believe that dysentery can arise without the existence of any organic affection in the liver, I see that its function is always implicated; and I cannot doubt either, that the worst cases are those in which the complicated structure of the liver had been previously affected, or that on the other hand dysentery may in time affect the wonderful organism of the liver—a connexion there is, however I may have failed like others to explain it; that existing between dysentery and abscess I shall have again to notice. And to conclude the present subject. If we reflect on the number of persons who make a complete recovery from dysentery, and that when dregs remain they are most prominent in the intestine, I think the inference legitimate, that dysentery in its most marked form may be present without any serious complication. When it is fatal on the other hand, there is abundant morbid alteration in the intestines themselves to account for death; and I cannot help thinking that some appearances in the liver described as morbid, merely depended on fortuitous differences in its complicated circulation, arising just before or after death.

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* This irritability will be shewn in cases of constipation by the smaller doses which are required.—*See observations on diet in chronic dysentery.*

Diseases of the cœcum as connected with biliary derangement.

The last affections to notice depending upon biliary derangement, are those of the cœcum and colon. There are many reasons for thinking that a sort of digestive process takes place in the cœcum, and this function is in some way connected with the liver. The subject demands working out, but it would seem that whatever the minutiæ of the function of the cæcum amount to, the presence of healthy bile is necessary: that when the fœces are not properly mixed with it, tension, discomfort, and even pain may be felt at the cæcum; and that the pain may sometimes transfer itself to the site of the liver.* The absence of good healthy bile is often a clear cause of the tardy passage of the fœculent matter along the colon, giving rise to fulness, discomfort and flatulent tenderness; when these symptoms occur, where the colon is in close contact with the liver, they are very apt to be mistaken for liver disease. It will be obvious that all these symptoms will appear in an aggravated form, where the large intestine is diseased from previous attacks of dysentery.

Diseases of the liver.

If we reflect upon the great size of the liver, and then consider that every lobule, which is about the size of a millet seed, has a distinct complicated and minute anastamozing of four series of vessels, it may well excite our wonder that in this climate, where its function is so constantly liable to derangement, it should ever be found free from organic disease. Perhaps it would not, if we had instruments perfect enough to detect deviations from nature in its minute anatomy.

In a practical point of view, I can see little use in trying to describe the morbid conditions which anatomists have detected in the liver—the black softening—the pale enlargement—the granular condition, with increase or diminution of size—the fatty degeneration.

In practice we meet with three morbid conditions of the organ that are chiefly and practically important.

Biliary obstructions.

First. Obstructions of the biliary passages.—These vary in all shades of amount, and depend upon a variety of causes. Jaundice has been briefly noticed already. Whenever we see the skin with a bilious tinge we may suspect that there is some portion of the liver secreting bile, whose biliary ducts are not pervious; and when the conjunctiva is yellow it is significant of the same condition, one which we see in many old Indians, but

Symptoms.

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* This pain is I believe often neuralgic the heptalgia of authors.

I believe it to be less frequent than formerly. Is this the effect of the hill stations, or of the diminished exhibition of mercury; for it would appear on excellent authority that this drug, the great panaceum for liver disease, may absolutely produce it. "Mercurial preparations," says Dr. Copland, "exert an undoubted influence in producing disease of the liver, either of an inflammatory or of an obstructive character." The next prominent symptom of biliary obstruction, is the absence or scantiness of bile in the evacuations. We are told by authority that the obstruction may arise from want of tone in the coats of the gall bladder, or in its ducts, or those of the liver itself. Swelling of the mucous lining of the duodenum is another cause producing it; and of course there may be mechanical obstructions from pressure, such as enlargement of the pancreas, or of the lymphatic glands in the neighbourhood of the cystic or common duct as described by Mr. Twining: but the common cause of pure and partial biliary obstruction without hepatic congestion is the viscidity of the secretion itself. When the obstruction occurs suddenly, there will be the absence of bile in the stools just noticed, or at any rate it will appear scanty;* there will be fulness after eating, high colored urine often tinged with bile, and a sallow muddy looking countenance with depression of spirits. I do not add a sense of weight in the right side because this is a sign of congestion super-added. The immediate treatment is bland diet and free purging: mercurials are supposed to stimulate the action of the ducts, and may be considered to remove obstruction by increasing the flow of bile. If we enumerate the usual causes of biliary obstructions, it will at the same time shew the best means of preventing them. Exposure to high ranges of temperature followed by chills, intense application to study, sedentary occupations, the use of ardent

Causes.

Treatment.

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[*] Dr. Copland, in his article on the liver in his Dictionary of Practical Medicine, has given several interesting cases to shew the complication of biliary obstruction with other diseases. It is perhaps correct to say, that in no acute disease should we neglect to emulge the liver. It is a kind of safety valve to the organs, which it is more difficult to deplete so directly.

spirits, rich diet—especially of animal food—without active exercise. When these obstructions are of long standing, they are the effect of a gradually produced amount of structural derangement in the liver, that will only yield to the influence of cold climate. We may have a difficulty in explaining how climate can alter structure, but the fact is undoubted. This chronic condition of disordered biliary function, depending as we must suppose on a slight amount of organic lesion, though there is often no perceptible change, is the prevailing disease of old Indians, carrying in its train the dyspeptic symptoms lately alluded to.*

Congestion of blood in the liver.

The second affection of the liver I will notice is sanguineous congestion. I do not purpose to go minutely into the investigation of congestion as shewing itself in each one or the whole of the vascular systems of the liver. "Congestion," as shewn by Mr. Kiernan, "may be confined chiefly to the hepatic veins, or it may exist in the portal vessels, or in both. These states of sanguineous congestion may be associated, especially when considerable or prolonged, with biliary congestion." Practically we consider that we have a case of congested liver to deal with, when there is a decided sense of fulness or weight in the right side, which sometimes extends with a sense of tightness across to the right hypochondrium, and this symptom may be accompanied by three separate conditions of the biliary secretion. First, an increased flow, which we may conceive to depend upon an increased determination of blood to the organ. Second, a diminished discharge of bile, when we may suppose that the circulation is obstructed or the quantity of blood less. In both these instances, the quantity as well as the quality of the bile may be altered. Thirdly, we may have congestion with a complete suppression of the biliary secretion. Here we can imagine that the engorgement of either the hepatic or portal veins may prevent secretion by pressure, or obstruct the passage of

Symptoms of

Acute congestion.

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* I have been in the habit of employing the nitro-muriatic bath very extensively. In all the chronic abdominal diseases of children it seems very useful.

A more chronic form.

Symptoms, causes and treatment.

the bile in the same manner. When congestion of the liver arises suddenly, the symptoms already mentioned, namely, the sense of weight, fulness and oppression in the right side, are marked and urgent, and some heat of skin and increased action of the heart will accompany. Active depletion is necessary, and usually very successful. But a more chronic form of liver congestion is what I am most familiar with; a sense of weight in the right side, with disordered and usually scanty secretions, pain often felt in the right shoulders, aggravated by constipation, by excesses in diet, by exposure to the sun, and by sedentary occupations. I have known this condition to persist for years, mostly complained of at the changes of season, and aggravated by exposure to the causes just noticed; but in those among whom I have practised, very seldom ending in deep seated abscess. Nor is this kind of liver congestion always attended with any tinge of the skin or conjunctiva. It would seem that as much bile as is secreted finds an outlet. I have met with some cases where the sense of weight and discomfort was accompanied by diarrhœa, and even then without producing abscess. Enlargement or hardening of the liver are the common effects of congestion.

Hepatitis and liver abscess.

I have arrived at the consideration of hepatitis and abscess of the liver; and I wish that I could hope to throw light upon a subject that is interesting, on account of the insidiousness and obscurity with which a disease, in itself imminently dangerous, sometimes progresses.

The acute form.

In practice we meet with acute and easily detected inflammation of the liver which may end in abscess.* I need not stop to describe its symptoms, and the best method of cure is not a matter of dispute. There is next a sub-acute form, where the disease is confined to the parenchymatous structure, in which, without any acute pain, careful examination will detect tender-

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* Mr. Parkes tells us, he has not met with this acute hepatitis. I have the recollection of an intensely acute case in a young European from exposure to a draught of air at night. It ended in abscess and death.

The sub-acute.

ness on pressure and enlargement, discovered principally by percussion. With these symptoms there will be some constitutional disturbance, a foul tongue, and muddy look of the countenance, with high colored urine. With the above symptoms we may have the bowels constipated and clayey, discharging disordered bile or with loose watery motions—the latter condition by far the worst.

The obscure form of liver abscess.

There is a third form of disease in which, without discoverable local symptoms, an abscess forms in the substance of the liver. I fear that we must confess that in the present state of our knowledge there are instances where the closest observers will be unable to detect the insidious advance of this destroyer, for almost every symptom by which we are told to diagnose it may be present without the disease advancing to suppuration. Even when matter has absolutely formed the symptoms are often very equivocal; but in a practical point of view the most important question is to be able to say in what cases there is a tendency to the suppurative formation, and the next how long it is advisable to persist in depletion. There are doubtless many who feel these to be easier questions than I do, for myself I will say that I know none more difficult or embarrassing. It is certain that symptoms of dysentery should always attract our attention to a close and minute examination of the liver, and that on the other hand the presence of even trifling hepatic symptoms should receive our serious attention in those who have had severe dysentery at any previous time. The slightest symptoms of pain should be attended to; the state of the countenance, the presence at any hour in the twenty-four of febrile movement, and the state of the urinary secretion must be minutely examined.*

Difficulty of discovering the existence of matter or the symptoms that threaten its formation.

Practical suggestions.

Remark on the signs suggested by Mr. Parkes.

In addition to the usual signs given by authors that matter has formed or is about to form in the liver, I may mention two lately suggested by Mr. Parkes, the nature of the dysentery and the specific gravity of the urine: but since he attributes the former to a total suppression of bile, a thing we may say not by any means always occurring; and the second to a theory that when the secretion of bile ceases uria ceases to be excreted by the kidneys, we may venture to assert that these signs must be as fallible as others.* I must admit, however, and it is a very important observation, that the kind of looseness he describes, is often diagnostic of abscess having formed, perhaps too that the formation is threatening. "The stools are loose, fœculent, yeasty, beaten up, or very thin, greyish or yellowish grey, frothy and slightly scalding; at times they get thicker, of a light yellow, but they are never dark, pitchy and thick." I am sure however that I have seen these kind of stools without the existence of abscess before or after them.† The lowered specific gravity of the urine if a sign of abscess is a valuable one. The color of the urine, and the presence or absence of bile in it, are all uncertain. I have seen intense jaundice and bilious urine when there was abscess, but they are not always present.

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* High colored urine, and especially if it is tinged with bile, should always excite our solicitude.

Author's sources of experience regarding the presence or absence of liver abscess

I have not met with many cases of liver abscess myself, and I ask myself the reason why? I have practised among Civilians: they are temperate and avoid exposure. I have practised among Indigo planters: many of them are obliged to expose themselves greatly to the sun, but they are very careful to keep the head well protected; and though generous livers, exposure to a fierce sun in a state of intoxication is indeed an exception to a general rule. I have practised among prisoners; I have hardly seen liver abscess among them. They are exposed to the sun all day, but they have always been accustomed to it, and they are low livers. Dysentery is a great cause of mortality with them, not so hepatic abscess as a cause or a consequence. I then ask myself, where I have seen this deep seated liver abscess; most of it in the European hospitals. I can recal to my mind while writing four cases in Civil practice. One of a young florid European who exposed himself to a cold blast of air after a hot day; the symptoms were very acute; he died, though the abscess burst into the intestines. The second was the case of a gentleman who lived very freely and took no exercise; the third was in an Officer of high rank of very temperate habits. It appears to have been caused by a fall from a horse, occurring however months before, and this slowness of progress is not the least peculiar feature of this disease of the liver. With the early history of the fourth case I am not well acquainted, but there was evidently a scrophulous taint.

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* The discharge of pure blood from the bowels is also stated by Mr. Parkes as a good diagnostic sign of liver abscess.

† We may imagine that these discharges depend upon morbid conditions of structure, that will progress to suppuration in those otherwise predisposed.

And inferences therefrom.

From the above observations I will venture to draw the following inferences.

1st. That exposure to the sun's rays with the head badly protected is a chief cause of liver abscess. We know not the exact reason, but we remind ourselves of the fact that blows on the head have often been followed by suppuration of the liver.

2nd. That the use of spirits or wine in large quantity would appear in this country apt to produce liver abscess. Exercise without exposure will in part obviate their bad effect.

3rd. Exposure to the sun with the head unprotected and while more or less under the stimulating influence of spirits, is the chief source of liver abscess. These causes, especially when followed by exposure to cold, may occasion a direct attack of hepatitis more or less acute, or a dysentery apt to end in abscess.

4th. Those of fair complexion and light fibre (the scrophulous) are most liable to be affected, and residence in India enhances that liability. It is in such habits that the other causes operate with double force, attacks of fever may be added to those mentioned.

The connexion of liver abscess and dysentery again touched upon.

Touching once more upon the connexion between hepatitis ending in abscess and dysentery, I may observe that though there is abundant proof that dysentery may exist without abscess, it by no means follows that attacks of dysentery may not and do not increase the liability to suppuration, the secondary or consecutive abscess. It is more commonly but not universally true, that the formation of matter in the liver, perhaps the diseased action likely so to terminate, is followed by the sort of dysentery or diarrhœa, we may call it either, which has been noticed.

Does dysentery depend on the sudden suppression of bile, and is abscess caused by the loss of function in the large intestines?

Mr. Parkes has endeavoured to connect dysentery with a sudden suppression of bile. The practical man must know that bile is often suppressed without dysentery, and that in most cases of dysentery it is occasionally present in the stools. He has offered another suggestion that secondary abscess depends upon the destroyed function of the cœcum and colon. This would leave primary abscess unexplained. and no one will deny that even when abscess occurs after dysentery many parts of the surface will be found in a state of integrity.

A few remarks on the treatment of hepatitis.

With respect to the treatment it is agreed that as long as we can trace the slightest pain on pressure and the state of the patient admits of it, depletion and starvation offer the best hope of cure, with purgation added if there be no dysentery. The puzzling cases are those where we may from the general symptoms guess that matter is forming, although the local ones afford no proof of it; and again it appears to admit of doubt whether we ought to deplete after there are undeniable indications of the existence of abscess. Some believe that even then the subduing of action will limit the size of the abscess. I doubt it, leaning to the opinion that the best plan then is to support the patient's strength, trusting that the abscess may burst into the lungs or some part of the intestines. Returning to the condition of the progress to abscess after we can deplete no longer, it is strange to think, and to find it yet a matter of dispute, whether mercury be useful, nay more whether it does not actually hurry the suppuration. It is not denied that most cases of liver abscess are accompanied by enlargement, and we know by experience that mercury will often remove enlargement of this organ, but this leaves it yet doubtful whether in the absolute condition that is to lead to abscess it will prevent it. If we consider the kind of patients who are the subjects commonly of liver abscess, and that we are unable to specify what cases would or would not run on to abscess if mercury had not been given, we must perhaps admit that the disrepute of mercury arises here from our expecting too much from its powers. I believe in most cases where it disappoints us, no other means would have saved our patient from death, and that in subjects of an ordinary degree of health it will prevent the formation of matter. Because I have stated my own opinion that it is wrong to deplete after the formation of matter, I consider it an important point to distinguish between the pain which arises from the action producing suppuration in the substance of the organ, and that which arises from the matter forcing itself towards some of the outlets by which it usually escapes. The history of the case will offer us the best means of judging, but the pain from the last named cause is generally more acute and defined. The history of exploratory puncturing does not seem favorable. The attempt to bring the pointing to the surface and to produce adhesion by seton or blisters is scientific and useful. I once saw a case I believe lost by delaying to puncture, where there could have been no danger by the erratic course of the pus.

Questions of abscess lying dormant or being absorbed.

There remain two very interesting points to notice in regard to liver abscess. Do abscesses ever exist in the liver in what may be called a dormant state, and are they ever absorbed? The wonderfully slow progress of some liver cases leads to the former question often being mooted, but my own opinion is that the slowness is usually before suppuration, not after it. I cannot, however, doubt that there may be such a thing as a dormant* abscess, though analogy must lead us to conclude that it cannot be frequent. With respect to absorption, there is proof that matter has been found in the blood, but this is more common when matter is in contact with textures more highly organized than the usual sack of an abscess.

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* A very interesting case of this kind has lately occurred in the hospital of the 1st Bengal Fusiliers at this station. The man had ten years ago an acute attack of hepatitis. It was diagnosed that matter had formed, and that he would die from it. On opening the body a round tumour was observed protruding from the surface of the liver. It was found to contain pure pus contained in a thick cyst or sack. The cyst was like leather.

### DISEASES OF URINARY ORGANS.

Their identity with those of other climates.

I had intended to notice, not quite so briefly as I must, how the progress of clinical practice in the dispensaries now spreading over India by the enlightened liberality of the Government, is gradually disclosing that the diseases of the kidneys and urinary passages are not essentially different from those of other countries, however much so may be. the amount of function which they may perform. Statistical facts will alone prove the relative frequency of the various diseases, but the existence of almost all of them my own observation enables me to affirm. I believe it is true that lithotomy is singularly successful all over India; no proof that dexterous operating is not in every respect desirable, but a source of comfort and gratification to those who have witnessed the fearful suffering caused by the disease for the relief of which it is performed.

Prevalence of calculus and success of lithotomy.

### DISEASES OF THE FUNCTION OF RESPIRATION.

Two main facts with regard to this function that appear to diminish the frequency of chest disease.

There are two physical facts connected with the performance of the respiratory function in a climate like this, which are indisputable; that the absolute quantity of inspired air is less, and that its temperature is higher. But here too, if the amount of function performed by the lungs is less, it does not appear to operate in causing the total absence of any of the

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* The experiments of Davy and others prove that the action of the heart and arteries is not permanently increased in this climate. A wonderful instance of the accommodating power of organism, if we reflect on the great heat that is sometimes endured. The diminished function of the lung is one cause permanently operating. I am not sufficiently acquainted with the laws of hydraulics to be able to say whether the above fact is proof against more active circulation in the capillaries. If so, what is the explanation of the rapid progress of disease in hot climates?

But statistical proof desirable on this point.

Return of mortality in the Cawnpore district shewing the prevalence of chest complaints.

And of phthisis particulars.

diseases this organism is liable to in other countries, but it does appear to moderate their extent and severity: to what exact amount in different parts of the country can only be proved by figures, and there are few points upon which statistical information would be more interesting. I am indebted to the indefatigable and able Magistrate of the Cawnpore district for a return of the mortality in 1847 within the limits of his jurisdiction, which I hope to be able to print at the end of this volume; but I may mention here that out of a total mortality of 7,043 there are 988 deaths marked down as diseases of the chest, under the three heads of asthma, cough, and as the natives appropriately name it *tup-dik* or consumption. Mr. Montgomery himself doubts the full correctness of this return, as in a mixed population of a million of people spread over a large extent of country and including several thickly peopled towns, it gives a total rate of mortality as low as 0.7 per cent.; but we may fairly receive it as coming near the truth in shewing the proportionate frequency of chest diseases to the general rate of mortality.

It may no longer be doubted that tubercular disease prevails among the natives of India. In this part of the country I have been led to think that it is especially prevalent; but I may have arrived at this conclusion from having seen so many cases of it in the dispensary at this station. In private practice however, I have met with it oftener in natives I think, than I recollect elsewhere, not lying dormant as Mr. Parkes observed, but running a speedy progress to death.

Have Europeans immunity from phthisis in this climate?

I cannot but think from the result of my own observation that Professor Webb has expressed himself far too strongly, as to the inutility of persons threatened with phthisis seeking safety in this climate. I am convinced that many, especially in the higher ranks, escape by the change partly as I believe from the peculiarities of our conventional habits, the freer circulation and more constant change of the atmospheric air in our houses, and the absence of any thing like real exposure. The soldier does not escape so often; he breathes foul air and exposes himself.

Bronchitis pneumonia and pleuritis are common but less severe.

But whatever may be true regarding tubercle—nor are we to forget that attacks of inflammatory action must be admitted to hurry the progress of softening—it seems undeniable that pneumonia bronchitis and inflammation of the pleura are less severe, and I believe less frequent than in cold countries. Both facts are well illustrated by observing the progress of the complications in epidemic measles or hooping cough. and in the acknowledged circumstance that epidemic bronchitis is a very mild disease in comparison among European residents in India.

## DIVISION III.

### DISEASES OF WOMEN AND CHILDREN AS MODIFIED BY THE CLIMATE OF HINDOOSTAN.

Diseases of women in India.

Circumstances of a private nature render it necessary for me to conclude, even more abruptly than I had intended when I commenced the division of this chapter just concluded. On the subject of the diseases of women, I had proposed to myself to notice, in some detail, how and apparently why they depend in this climate more upon relaxation than stenic action; and that I believe the diseases of the cervix, now elaborated into so formidable a catalogue by European writers, are extremely common though little recognised in India. What would Lisfranc say if he knew there was not such a thing as a speculum to be had in this country. I am of opinion that these diseases are the frequent cause of sterility and abortion, as well as of the impaired health, the pale faces and emaciated looks that often send the sufferers to Europe, when they might be cured here. All this seems to shew that these diseases are not often seriously or speedily injurious to health, though they may diminish fecundity.

Those of the cervix considered, prevalent though overlooked.

Absence of puerperal fever.

The rarity or as I believe the total absence of true puerperal fever was also a subject I intended to notice prominently, as curious and important. I have known a case go by the name in India, when death arose by the child's head being left far too long pressing upon the external parts of the mother.

Child birth.

Result of the author's experience after long and extensive practice.

Necessity of guarding against hœmorrhage.

But what I had chiefly in view in relation to this branch of my subject, was to point out, and that principally to the young practitioners in India, the advantage of careful solicitude in our attendance on cases of child-birth, as well during labor as when convalescing. Boasting of no particular skill, and acknowledging that in the mechanical branch of midwifery my practical experience has been very limited, I have great satisfaction in stating that after twenty-one year's practice in a pretty wide field, I have never lost a woman in child-birth, or from its effects. Bleeding is the chief danger I have met with. I am always on the watch for it, and I endeavour to guard against it on the principles of keeping up pressure till there is full contraction, and by meeting its occurrence boldly on the other principle that there is no safety till every thing is removed that can prevent full contraction, and till we have secured it by the hand. I had intended to go into minute detail of the rules I observe according to the varying circumstances under which hœmorrhage may occur. The secule cornutum I have not satisfied myself to be trust-worthy here, although I am quite convinced of its powers in bringing on uterine contraction before the birth of the fœtus. In my obstetrical practice I have had remarkable instances, how different women bear the loss of blood; some enduring large discharges without any impression on the circulation or other functions, while others exhibit alarming symptoms by the loss of small quantities. As it appears to me that this should be made a great guide for treatment, it strikes me to be a great argument against the indiscriminate use of chloroform.

Use of secule cornutum.

And the exhibition of chioroform.

Convalescence and suggestions for treatment.

During the period of convalesence, the earliest symptoms of increased action in the vascular or nervous system, (the one may implicate the other,) if accompanied by abdominal or uterine tenderness on pressure, must be attacked with promptitude and decision. One bucket of water will quench a spark, many may fail to extinguish a fire.

The practice of giving beer or wine to nurses indiscriminately, condemned.

There is a practice almost universal among the higher classes of society in India which I wish to condemn. I allude to the exhibition of beer or wine to nursing women without reference to their constitution or previous habits. I believe that this forcing system often makes women bad nurses, that might have been excellent ones; not to speak of the bad habit that it may and sometimes does engender in those who are never so loveable and attractive, as when their thoughts are pure and their habits abstemious. In those who are evidently weakened by nursing, beer or wine, in moderate quantity, but never to the production of the slightest vascular excitement, will prove useful.

## DISEASES OF CHILDREN.

Remarks on the early decay of Europeans' children in this climate.

It appears to me that there is one question regarding the health of European children in India, which merits the profound consideration of the most eminent physiologists. Place an European and native infant in exactly the same circumstances in all possible respects, they will thrive equally during infancy; but as childhood advances the native will continue to thrive while the European child will begin to emaciate and to look pale; and as I have stated in the first chapter, there is not a record of a third descent from pure European stock in the Indian resident. Upon what principles can we account for this? I have endeavoured to persuade myself that the curious circumstance may depend upon a want of consent between the assimilating and nutritive processes and those of the sexual function. We may imagine that the first are in a certain degree influenced by hereditary descent, while the early advent or approach of puberty, a new attribute of the organization, is an effect of the climate.

Exemption from death by the exanthemata.

It is a very principal difference in the diseases of Indian children, how little mortality they suffer from the exanthemata small-pox excepted, and even this has reference to native children. Of the diseases of the head I believe I may say, that we may again state with regard to them that extreme heat and exposure give rise to them, while in cold climates head affections of children often clearly arise from exposure to cold. This is another instance of the substitution of causes in disease. The abdomen, however, is the great hot-bed of Indian infantile disease, and I believe that very many head affections are consecutive. The frequency of dysentery during dentition deserves notice, as seeming to prove the susceptibility of the large intestine to impressions of irritation in this climate. Query—is this from sympathy with the liver ?

Diseases of head and abdomen

Prevalence of dysentery.

Concluding observations.

I have thus brought my task to a conclusion. None can be more conscious than myself how imperfectly it has been performed. I know that I have no right to urge any private circumstances in extenuation, however much they may have been calculated to interfere with a calm exercise of thought and judgment; but I have one consolation which the failure to earn public approbation cannot deprive me of. I feel that my own knowledge on the subjects I have treated has been improved. The great John Hunter well observed that putting one's thoughts in writing, might be compared to a merchant taking stock—it shows you what you have, and it tells you also what you require.

### NOTE TO SECTION ON FEVER, CHAPTER FOURTH.

### *Remarks by Dr. Graves on the use of Opium and Wine in fever referred to in page 229.*

I have long endeavoured to impress on the minds of students the great importance of studying with attention that stage of fever in which wine and opium are occasionally the best remedies, with a view of learning what symptoms indicate their exhibition.

In the commencement of fever, we can decide with a good deal of certainty upon the most proper course of proceeding, but as the disease advances, the symptoms become more complicated, the indications more confused, and the plan of treatment consequently doubtful. In this stage of fever it is that we must rely on the tact acquired by previous experience and reflection; and must often depend more upon a correct estimate of the general state of the system, than upon the appearance or absence of any particular symptom. It is not my intention at present to do more than prove the truth of this assertion, by shewing that the presence of some symptoms, commonly supposed to contra-indicate the exhibition of wine and opium, ought not to deter the practitioner from their use, provided that other circumstances seem urgently to require it.

1st. In the first place, as to the tongue at an advanced stage of fever, I have often derived the greatest advantage from wine and opium, although the tongue was dry, the colour of old mahogany, or else covered with a yellowish brown fur, and protruded with difficulty, while the teeth and gums were covered with sordes. Wine and porter in moderate quantities seem *generally* to agree better with this tongue than opium; in some cases, however, the latter is indispensable.

For fear of misleading the reader I must again remark, I by no means wish to assert that such a tongue uniformly, or even frequently, indicates the use of these medicines; on the contrary this state of tongue and mouth will often be observed at a time when leeches and the antiphlogistic treatment are required.

Let it be clearly understood, however, that at an advanced period of fever this state of the tongue may exist, and yet wine and opium may be given boldly, provided, as I have said before, the general state of the patient seems to require it.

2ndly. The observations I have made concerning the tongue are applicable to suffusion of the eyes. The eyes may be heavy, a little red and very much suffused, and may have the singular expression of watchfulness, combined with great redness of the conjunctiva, which is termed a ferrety eye, and yet wine or opium may be the only remedy capable of saving the patient's life. It should always be borne in mind that want of sleep tends to make the eye red, and that this condition is often when it occurs in maculated typhus, analogous to the similar appearance of the eye which is observed both in measles and scarlatina, in which diseases it is merely a part of the general erythema, and does not contra-indicate the use of wine and opium, if other circumstances call for their exhibition.

3rdly. A hot and dry skin does not necessarily contra-indicate the exhibition of wine and opium, particularly where there is at the same time a tendency to coldness of the extremities.

4thly. The presence or absence of delirium must always excite our attention when the question of giving wine or opium arises. I believe that these medicines are never applicable when the delirium is violent and continuous; but the patient may rave a great deal particularly at night; he may mutter and speak to himself—he may point to various imaginary appearances, and may fancy himself surrounded by persons or things which have no real existence—he may be restless and irritable, constantly endeavouring to leave his bed for the purpose of walking about the room or sitting by the fire, and yet he may be in a state urgently demanding wine and opium. On a more accurate examination, we find that his delusions are not so strong as to leave no room for the exercise of his reason. When spoken to emphatically, he answers in some cases incoherently; but in others with perfect precision and presence of mind, and does not for some minutes relapse into his former wanderings. This state of mind is usually accompanied by an almost total want of sleep; and in many by a great anxiety about their illness. To procure sleep, it has been well remarked by Latham, in a late number of the Medical Gazette, is here one great object, and this can only be done by means of wine and narcotics. In some the mental aberration is scarcely perceptible, and they have all the character of great excitement of the nervous system, without any actual raving or delirium. There is general tremor and subsultus. The tongue is tremulous when protruded or when moved in speaking, and consequently the articulation is uncertain and interrupted; while in the general manner and mode of answering questions, the patient strongly resembles a person effected with delirium tremens. This group of symptoms is likewise accompanied by want of sleep, and best treated with wine and opium.

5thly. The appearance of the face has been much relied on by some, as capable of guiding us in forming our decision. Heat of head and face, redness of the cheeks and strong pulsation of the carotids, are well known as contra-indicating wine or opium; but in the advanced stages of fever the face like the eye may be suffused, it may be seen occasionally flushed, and when flushed it may be hot, and yet wine and opium may nevertheless be our only resource.

6thly. Head-ache when violent is at any period of fever a decisive circumstance. Sleep cannot be obtained while the pain is unmitigated, and we must therefore attempt to conquer it by the most active treatment, by local applications to the head, by depletion from the vascular system, and by purgatives. Sometimes, however, these means fail, and the physician feels that he cannot pursue this mode of treatment any further. Under such circumstances a dose of opium boldly exhibited will occasionally succeed in procuring sleep, from which the patient awakes nearly free from head-ache. Before having recourse to this remedy, the effect of a blister to the nape of the neck ought to be tried. In the more advanced stages of fever, the head-ache or rather the heaviness felt in the head is something very different from the throbbing acute head-ache just spoken of, and constitutes no contra-indication to the use of wine and opium.

7thly. The state of the pulse requires to be duly considered. Its frequency is not of much importance, for I have seen wine and opium serviceable in all its varieties from 70 to 130, or even upwards. No one would ever think of exhibiting these remedies when the pulse is strong, and more particularly when it is strong and hard; but the case is otherwise when it possesses only a certain degree of *hardness*, and is at the same time small and thrilling, and not resisting compression with the force the sensation of its hardness leads us to expect.

Such are the chief observations I have made on the particular circumstances and symptoms supposed capable of throwing light on this important practical question. They may serve to prevent the student from being misled by rules of practice dogmatically deduced from the observations of any single symptom, and may lead him to turn his attention more accurately to the previous progress of the fever and the general state of the patient.

It is almost superfluous to add, that when any doubts arise as to the propriety of giving wine and opium in fever, they should not be tried unless their effects be carefully watched by the physician himself.

### NOTE TO SECTION ON FEVERS.

*The following has reference to matters which have been discussed in the section on fevers—Chapter 4th; and see pages* 81 *to* 88 *in chapter on Climate.*

### MOST IMPORTANT DISCOVERY.

Let us turn to the pleasant task of giving what publicity we may to a discovery made by a French gentleman, Monsieur Ledoyen, a Parisian Chemist, in concert, it would appear, with a Mr. F. C. Calvert, who seems to have received his education as a chemist at Paris and who is now lecturer at the Royal Institution of Manchester. This discovery, which under the auspices of Lord Morpeth has been submitted to the most searching tests by Dr. Southwood Smith, Mr. Toynbie and Mr. Grainger, promises to be one of the greatest boons ever bestowed on suffering humanity.

The discovery is nothing less than the means of disinfecting all fœtid animal substances and gases by a liquid, which is very cheap, simple, and can be applied by any person with the greatest facility.

The three medical gentlemen appointed by Lord Morpeth to inquire into the real value of Mr. Ledoyen's discovery, present us in their report with a dismal catalogue of the offensive and dangerous vapours from animal and vegetable substances, which at all times infect the air we breathe in a greater or less degree, according as we more or less neglect their impure origin. Those arising from vegetable putrescence generate disease and fever of a remittent type, while those arising from animal matter are of a typhoid character.

We learn from the same source that the gas upon which the odours of putrefying substances chiefly depend is *sulphuretted hydrogen.* Now, two methods have hitherto been made use of by chemists to destroy or prevent offensive compounds, in which this gas is mixed up, by the first, the component elements of the compound are altered into new elements. By the second, certain of the elements are fixed so as to render the substances themselves no longer volatile. It is supposed that Mr. Ledoyen's process is founded on the second method. Be this as it may, the commissioners state that they have tried the effect of this fluid. 1st.—On substances already in a state of descomposition. 2nd.—On substances undergoing the process. 3rd.—On the most offensive substances not decomposed. 4th.—On impure air.

In every instance except the second, these experiments have been attended by the most miraculous result, and even in that case the failure was only a partial one; for the commissoner's state that whilst the fluid may be regarded as a useful addition to the preparations already known for preserving parts for dissection, it has no peculiar efficacy in the preservation of the dead body. This one qualification made, they give their united testimony to the efficacy of this fluid for destroying all impure odours arising from putrescent vegetable and animal matter. A cloth saturated with the liquid is waved for a short time in a room which has been purposely filled with the foulest stenches the most learned in such matters could devise, and in a few moments all offensive odours disappear, and the air is rendered fit for human use.

It would seem that some mysterious power had sent us Mr. Ledoyen and his discovery, to compensate for the shortcomings of the Premier and Lord Morpeth.—*From the Bengal Hurkura of 6th November*, 1847.

## NOTE FIRST TO SECTION ON CHOLERA, CHAPTER FOURTH.

### *Letter from Dr. Walker.*

MY DEAR MACKINNON,

In returning the accompanying papers, for which accept my thanks, I have the pleasure, in accordance with the request contained in your note, to subjoin the view which I entertain of the efficient or proximate cause of cholera, viz.

1st. That the malarious matter usually existing in the atmosphere in a diffused and diluted form, becomes, from unknown meteorological influences, concentrated and virulent; and capable, on absorption into the circulation of a predisposed system, of inducing a salutary process for its destruction, or expulsion, consisting of an inflammatory state of the sub-mucous cellular tissue of nearly the whole of the small intestine.

2d. That all the well-known and generally constant symptoms of cholera, indicative of morbid affections of the circulatory, respiratory, nervous and secretory systems, are the natural result of inflammation of so extensive and vitally important an organ.

3rd. The following is an abstract of the principal morbid changes which occur in the inflamed intestine, deduced from Dr. Böhm's and my own microscopical researches. An inflammatory effusion of serum occurs into the sub-mucous cellular tissue, producing a thickened state of the bowel, and inducing a rapid desquamation of the epithelial cells, and a very copious discharge of the serum of the blood from the denuded basement membrane, including its tubular and villiform processes. Towards the end of the ileum the villi are found ruptured, and their contained structures disorganized.

The intestinal contents and evacuations consist of the constituents of the serum and the detritus of the epithelium. The appearance of the evacuations depends on the state of sub-division and relative proportion of these substances, being flocculent or gruel-like, when the epithelial cells and clots of fibrine and albumen float in masses in a scanty supply of fluid; creamy, milky, or rice water-like when minutely divided and suspended in a considerable quantity of fluid. The yellowish, white, lymph-like substance which often lines the small intestine, appears to be a mixture of fibrine and the albumen of the serum, retained by reason of its numerous attachments to the denuded and lacerated surface of the villi, and to the innumerable projecting little tubuli which are the detached epithelial linings of the Lieber khunian follicles.

4th. That the morbid state just described is capable of inducing all the general morbid states and symptoms characteristic of cholera is proved by analogy. From the acknowledged hamology of the skin and mucous membrane, as exhibited in their development from the same source in the embryo, their general identity of minute structure, similarity of function, mutual sympathy, and perfect continuity, we should infer, a priori, that their *general* pathology would be similar. That such is really the case will be apparent, from the perusal of the following extracted account of the constitutional effects which result from superficial burns, affecting a large surface ($\frac{2}{3}$rds) of the body, which also shows how closely the train of morbid changes and symptoms resemble those of cholera. " In such cases the pulse at first rapid and contracted, soon diminishes in frequency becoming short and intermittent; often scarcely to be felt, indicating a distinct obstruction to the circulatory current. Depletion affords only transient relief, and the flow of black blood from the vein stops long ere the desired quantity be withdrawn, or as frequently occurs no blood whatever can be obtained, though several veins have been punctured. The breathing becomes laborious and oppressed, dyspnœa, together with an intense feeling of anxiety precede dissolution. There may be total or partial abolition of consciousness, from which, if the sufferer be roused, he evinces languor and apathy, and replies slowly and imperfectly to questions that are put to him. There is great prostration of muscular power, the limbs remain immoveable, and abandoned to their own weight, agitated from time to time by convulsive shudders, or spasmodic twitches. The surface of the body in the parts unscathed by the fire are cold and pallid, sometimes bedewed with a clammy sweat."—*Cyclop. Pract. Surgery Art. Burns and Scalds., vol.* i., *page* 542.

These views were first suggested by me in 1844 while lecturing on the minute anatomy and physiology of the digestive organs in the University and King's College, Aberdeen, but it was not till I arrived in India that I had an opportunity of verifying them. It is only within the last few days that, through your kindness, I have learned that Dr. Böhm has since 1839 entertained similar views, although I have long been well acquainted with his valuable researches on the minute anatomy of the mucous membrane as published in his work.—*De Gland Intest. Struct. Penit.*

When judiciously treated in its earliest stage, I believe (after having seen about 100 cases) that it becomes as manageable as most other acute diseases; but that death is so frequent an occurrence in cholera, can only be surprising to him who is unacquainted with the vital importance of the intestinal epithelial cells, basement membrane, and contents of the villi, and unaware of the extensive and irreparable injury they sustain. As nothing less than the creation of a new set of organs could enable life to be continued, it is not wonderful that in the most advanced stage of the disease, medicine should fail where nothing less than a miracle could succeed.

In conclusion, what a field for speculation and investigation does the subject of pestilence afford! What part in the economy of nature does pestilence perform? Believing that all things work together for good, and that like as when the causes of storms and tempests are fully known, it will doubtless then be apparent that they have been appointed for some benevolent end; so when with the advancement of science and philosophy we shall be enabled to see further into the vista of creation, and know something concerning the origin of pestilential poisons, we shall then regard them, not merciless and unprofitable scourges, but rather as wise and benevolent manifestation, of the economy of Providence, by which the millions of mankind are saved by the sacrifice of its thousands!

On some future occasion I may communicate to you a view which I have not yet had leisure to work out, namely, that remittent, intermittent and yellow fever, cholera and plague, result from one cause, modified in its effects by barometrical, thermometrical and hygrometrical influences acting on it and on its recipients.

I remain,
My dear Mackinnon,
Yours sincerely,
JAS. PATTISON WALKER.

*Humeerpore*;
*15th May*, 1848.

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### NOTE TO SECTION ON CHOLERA.

*2nd Letter from Dr. Walker.*

MY DEAR MACKINNON,

If you think my letter worthy of publication, I have no objection to your doing so. With regard to the intestines being inflamed in cholera, I would refer you to Böhm's remarks on the point. The nature of the organic changes which occur in the small intestines in cholera, require for their production something more than congestion—if more than congestion how much less than inflammation—the existence in the sub-mucous cellular tissue of the characteristic "exudation corpuscules" would settle the point, but this knowledge is still I believe a desideratum.

In those who died after a few days, I think it will always be very evident, that the fatal hectic fever depended on inflammatory disorganization of the mucous membrane.

I must, however mention, that I think the inflammation at the commencement of the disease must be more akin to erysipelas than to ordinary inflammation being characteristed ; more by rapid diffusion and exudation of serum, than by the exudation of organizable fibrinous products.

With regard to treatment, I think that the indications are to relieve the asphyxiating pulmonary congestion by early blood-letting to subdue the morbid action in the intestines and mucous membrane, by the copious exhibition of a very diluted aluminous drink. To soothe its irritated state by the moderate and continued exhibition of sedatives—to support life by the repeated administration of moderate doses of stimulants, and to restore the cutaneous circulation by warm applications and frictions. Camphorated tincture of opium with the addition of brandy is a very useful form, combining as it does stimulant and sedative properties. If you see the case early this plan will answer in many cases ; if you see the case late, I fear the old event will follow any treatment, the great majority of the cases I have seen were of the latter kind.

*Humeerpore* ;
*2nd June*, 1848.

Yours sincerely,
JAS. PATTISON WALKER.

NOTE SECONDTO SECTION ON CHOLERA, CHAPTER FOURTH.

Mr. Joham Baggs in a late lecture on the subject of cholera, denominates the course taken by it. " Plague lines as in " all cases the cholera had followed, the track taken by the " plague formerly. All cities and large towns so visited, were " situated on the banks of rivers or lakes and in low situations " the high lands being guite exempt from this mysterious dis- " ease. It originally emerged from the pestilential swamps of " Central Asia. It had passed the frontiers of Persia and " moved over the vast plain of Russia, from Moscow, St. Pe- " tersburgh and south to Odessa, and extended its ravages to "the cities of Galicia and to Egypt; from the Ganges and "Vistula to the mouth and stagnant places of the Nile. The "whole of Western Europe are now making preparations to "mitigate its severity."

The theorem of this gentleman is, that the cholera is produced by the peculiar electric condition of the atmosphere particularly in low and damp situations.

The lecture was illustrated by numerous experiments bearing on the question.—*Extract from Times Newspaper, after the section on cholera was written.*

## POSTCRIPT.

Believing that the records of Pension Paymasters would supply valuable facts on the subject of vital statistics, I solicited and obtained the sanction of the late Governor General to apply for the information I wanted. The call was responded to, with one exception; but on examining these tables before sending them to press, I find them so full of mistakes that I cannot publish them. They could not be corrected without a reference to the offices whence they were obtained.

*FINIS.*

## HER MAJESTY'S 21st FUSILIERS.

*TABLE of diseases and deaths from the arrival to the period of the Corps in India from* 29*th April*, 1839, *to the* 15*th January*, 1843 *in the " Bengal Presidency ;" and from* 16*th January* 1843, *to* 31*st December* 1845, *in the " Madras Presidency ; " and from* 1*st January to* 31*st March* 1847 *in the " North Western Provinces."*

| | Fort William and Chinsurah. | | Fort William and Dinapore. | | Dinapore. | | Dinapore and on march to Kamptee. | | Line of march and at Kamptee. | | Kamptee. | | Kamptee and on march to Agra. | | Agra and on march to and at Cawnpore. | | 1st April 1847, Cawnpore. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average Strength, .. .. | 453 | | 763 | | 837 | | 880 | | 999 | | 1046 | | 1139 | | 1092 | | Total deaths since arrived in India. |
| DISEASES. | 29th April 1839<br>1839 & 1840. | | 1840 & 1841. | | 1841 & 1842. | | 1842 & 1843. | | 1843 & 1844. | | 1844 & 1845. | | 1845 & 1846. | | 1846 & 1847. | | |
| | Treated | Died. | Treated | Died. | Treated | Died. | Treated | Died. | Treated | Died. | Treated | Died. | Treated | Died. | Treated | Died. | |
| Fevers, .. .. .. | 250 | 6 | 499 | 15 | 236 | 7 | 644 | 16 | 550 | 9 | 798 | 21 | 6 9 | 11 | 2779 | 17 | 102 |
| Pulmonic affection, .. .. | 42 | ,, | 107 | 4 | 186 | 5 | 111 | 10 | 95 | 4 | 123 | 5 | 156 | 3 | 125 | 6 | 37 |
| Hepatic ditto, .. .. | 17 | ,, | 81 | 4 | 178 | 22 | 101 | 9 | 73 | 4 | 90 | 4 | 106 | 5 | 71 | 2 | 50 |
| Rheumatic ditto, .. .. | 38 | ,, | 151 | ,, | 146 | ,, | 124 | ,, | 122 | ,, | 89 | ,, | 140 | ,, | 131 | ,, | ,, |
| Variola, .. .. .. | ,, | ,, | 1 | ,, | ,, | ,, | 1 | ,, | ,, | ,, | 11 | 4 | 4 | 1 | 1 | ,, | 5 |
| Dysentery, .. .. .. | 64 | 11 | 258 | 24 | 406 | 40 | 219 | 22 | 126 | 8 | 113 | 9 | 244 | 22 | 127 | 20 | 156 |
| Apoplexy, .. .. .. | 5 | ,, | 2 | 1 | 17 | 12 | 8 | 8 | 3 | 3 | ,, | ,, | ,, | ,, | 2 | 1 | 25 |
| Cholera, .. .. .. | 23 | 12 | 41 | 21 | 62 | 30 | 28 | 14 | 1 | ,, | ,, | ,, | 9 | 6 | 5 | ,, | 83 |
| Diarrhœa. .. .. .. | 215 | ,, | 237 | ,, | 109 | 2 | 248 | 6 | 161 | 6 | 224 | 4 | 181 | 7 | 148 | 9 | 34 |
| Delirium Tremens, .. .. | 5 | ,, | 3 | 1 | 7 | 2 | 2 | ,, | 6 | 2 | 2 | ,, | 4 | 2 | 10 | 1 | 8 |
| Paralysis, .. .. | 1 | ,, | ,, | ,, | 1 | 1 | 2 | ,, | 4 | 1 | 2 | 1 | ,, | ,, | 2 | ,, | 3 |
| Ehilepsia, .. .. | 6 | ,, | 6 | ,, | 8 | ,, | 3 | ,, | 2 | ,, | 6 | ,, | 15 | 2 | 5 | ,, | 2 |
| Venereal disease, .. .. | 227 | ,, | 473 | ,, | 419 | ,, | 367 | 1 | 336 | ,, | 336 | ,, | 247 | ,, | 151 | ,, | 1 |
| Wounds and Accidents, .. | 108 | ,, | 115 | 7 | 97 | 1 | 122 | 1 | 114 | 2 | 142 | 3 | 154 | 2 | 41 | ,, | 16 |
| Morbi. Oculorum, .. .. | 18 | ,, | 30 | ,, | 48 | ,, | 67 | ,, | 75 | ,, | 33 | ,, | 26 | ,, | 22 | ,, | ,, |
| Other Diseases, .. .. | 236 | 1 | 416 | ,, | 424 | 8 | 294 | 4 | 297 | 1 | 295 | 3 | 212 | 1 | 460 | ,, | 18 |
| Anasarca, .. .. .. | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, | 10 | 3 | 3 |
| Total ...... | 1255 | 30 | 2420 | 77 | 2344 | 130 | 2341 | 91 | 1965 | 40 | 2264 | 54 | 2127 | 62 | 4090 | 59 | 543 |

I am indebted to Mr. Dempster the Surgeon of the Regiment for this return.

*STATEMENT shewing the mortality of the Cawnpore district, during the year 1847, and the prevailing diseases.*

| | | Total population. | NATURE OF DISEASE CAUSING DEATH. | | | | | | | | | | | | | | Percentage of deaths to population. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Fever. | Small pox. | Asthma. | Cough. | Consumption, (tup-dik.) | Dysentery, | Cholera. | Boils and sores. | Decline (sookha.) | Child-birth. | Sudden death without previous illness. | Old age. | Other diseases not enumerated. | Total deaths. | |
| Hindoos. | Male Adults... | 331471 | 1036 | 27 | 212 | 116 | 116 | 312 | 146 | 47 | 48 | 0 | 146 | 168 | 175 | 2549 | 0.8 |
| | Female Adults.. | 298288 | 591 | 5 | 164 | 92 | 87 | 170 | 78 | 25 | 30 | 65 | 75 | 121 | 99 | 1602 | 0.6 |
| | Boys. .. .. | 173814 | 432 | 384 | 15 | 35 | 11 | 85 | 36 | 20 | 74 | 0 | 77 | 3 | 195 | 1367 | 0.8 |
| | Girls. .. .. | 121316 | 287 | 279 | 9 | 30 | 3 | 80 | 15 | 9 | 44 | 0 | 34 | 4 | 112 | 906 | 0.7 |
| Musselman. | Male Adults... | 26559 | 82 | 1 | 23 | 9 | 10 | 24 | 24 | 5 | 0 | 0 | 15 | 7 | 38 | 238 | 0.9 |
| | Female Adults.. | 25625 | 60 | 0 | 12 | 9 | 18 | 15 | 9 | 2 | 1 | 5 | 2 | 13 | 7 | 153 | 0.6 |
| | Boys. .. .. | 13091 | 40 | 22 | 2 | 8 | 1 | 13 | 2 | 5 | 8 | 0 | 1 | 0 | 32 | 131 | 1.0 |
| | Girls. .. .. | 10156 | 37 | 26 | 0 | 6 | 0 | 5 | 2 | 2 | 3 | 0 | 1 | 0 | 12 | 94 | 0.9 |
| | Total... | 1000320 | 2565 | 744 | 437 | 305 | 246 | 704 | 312 | 115 | 208 | 70 | 351 | 316 | 670 | 7043 | 0.7 |